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ABSTRACT

The focus of this study was upon students who were academic "risks." The basic definition of "risk" was based on a cutoff of 620 in College Board verbal scholastic aptitude scores. A study was made of the past success of these risks, with the major purpose of finding new variables and methods which would assist admissions officers in the selection of potentially successful risks. Part 1 of the report deals with four nonacademic variables developed to supplement traditional academic pre-admission data. They were: an admission index, based upon counselor ratings of motivation and promise found in secondary school records used by a group of colleges including Brown University; an environmental index, consisting of parent-home-school-community items; and two activity indices derived from a survey of activities and accomplishments in high school. Part 2 deals with criteria of success: (1) graduation; (2) attainment of an advanced degree; (3) reputation for success; (4) occupational grouping and success; and (5) grade point average for the first semester in college. Part 3 discusses the other "risks" that were examined: the under- and overachievers; the holders of imbalanced scholastic aptitude test scores; and intuitively defined risks. (AF)

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FINAL REPORT

of the study of

SUCCESS AND ADMISSION CRITERIA FOR POTENTIALLY SUCCESSFUL RISKS

by

Everard Nicholson

Assistant Professor in Education,
Research and Educational Measurement

PROJECT UNDER GRANT

from

THE FORD FOUNDATION

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Brown University
Providence, Rhode Island
MARCH 1970

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And to many others, including the office staffs of the Deans, student Research Assistants, and the typists.

CONTENTS

page

CHAPTER I The Scope, Need and Introduction 1

CHAPTER II Summary of Findings 10

CHAPTER III Traditional Variables, Samples and Design 51

CHAPTER IV The Admission Index 75

CHAPTER V The Environmental Index 89

CHAPTER VI The Activity Indices 110

CHAPTER VII Prediction of Graduation as a Criterion of Success 131

CHAPTER VIII Success beyond Graduation 163

CHAPTER IX Occupational Success 190

CHAPTER X A Miscellany of Other Risks 215

Bibliography 245

Appendix 249

To Betsy and Arthur
who sponsored my coming from England
to this wonderful country
fifteen years ago

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CHAPTER I

THE SCOPE, NEED AND INTRODUCTION TO THE STUDY

It is a sign of the times that for many the road to opportunity passes through the gates of a college. The flush of applications for admission that marked the sixth decade of the twentieth century has resulted in not a few colleges annually processing several times as many applications as places to be filled. The selectivity and rigorous admission requirements that have become associated with such colleges have placed upon admission officers the burden not only of selecting from an increasingly restricted and homogeneously able group of people but also of not accepting many who would be well able to succeed. Courtney Smith, the late president of Swarthmore College, is reputed to have told his faculty that half of them probably would have been denied admission were they competing for admission with the students about whom they were complaining.

The 1970's bring vastly increased opportunities for all youth to enjoy the education that is offered by the so-called prestigious colleges. Such colleges, however, are not entirely open to all who may profit from attendance. The barriers are not now race, color or creed but often the descriptions of students that are indelibly written in secondary school records or the scores that are obtained from national tests of scholastic aptitude and achievement. The question whether such scores have been used, accidentally or otherwise, to create new barriers to the progress of deserving students is a very important one. Obviously many who are turned away by these institutions go elsewhere and become successful. It is also very obvious that as the admission policies of institutions such as Brown became increasingly selective many students who were successful in the past may have been denied admission in later years.

Spiralling selectivity has resulted in a paradox, for at the same time that policy has opened up to allow for the acceptance of more students with need for financial assistance, the range of ability of applicants has been narrowed through the restrictive nature of admission requirements. If it were shown that higher selectivity, and too often this has meant higher and higher class means of scores such as those of scholastic aptitude tests, actually led to elimination of candidates with probability of success equal to that of those who are accepted, then such a policy would be self defeating. Yet there is an absence of studies of the later success of such individuals, an absence of studies of the effects of restricting selection to the few who happen to fall at the higher end of the distribution of such scores, and an absence of instruments other than academic measures to assist in the selection of candidates for admission. One of the purposes of this study was to create non-academic variables. An Admission Index derived from secondary school counselor ratings of the promise of students, an Environmental Index from parent-home-school-community items, and two activity indices, LAS and LOMAS, measures of leadership, athletic and social participation and literary, oratorical, musical, artistic and scientific activities and accomplishments in the pre-college years, are proposed.

Realizing that there was a real need to examine whether there has been over-dependence upon limited traditional data, the Director of Admissions at Brown, Mr. Charles H. Doebler, IV, wrote as an introductory statement to the original proposal for this study:

> On the assumption that the race is not always to the swift nor the battle to the strong, it is well to examine the admission procedures of the highly selective colleges to see if in the flush of success in having more applicants than we can take care of, we are not eliminating students we would like to have, both now and in the future. These are students whose academic qualifications are less than first rate, but whose personal qualities are such that we can hope that they cannot only graduate from college but can also contribute greatly to the college and the community during and after their academic careers.

Clearly, this admission officer put himself among those who would like to take a second look at the consequences of restricting the student body to a limited group of those who score highly on traditional academic pre-admission data. The focus of this study and report is upon risks whose academic qualifications were less than first rate. The reader may object to the term "risk", but the word is used in its relative sense. It is realized that the risks of some colleges are not necessarily risks in other colleges. The basic definition was based upon a cutoff of 620 in College Board verbal scholastic aptitude (SATv) scores. Such a point defines approximately the lower one-third of currently admitted students, who could be considered risks to the extent that twice as many have superior indicated verbal ability. Since the scholastic aptitude tests have become classical tests for admission purposes, use of one of them is meaningful to admission officers, secondary school counselors and applicants. Also, since it is an aptitude test, definition by a cutoff amounted to partial control of ability. Finally the typical applicant with an SATv score less than 620 would not assume that his chances for acceptance were first rate. A study of the past success of such risks could be quite important for an important group of applicants as well as for the admission officer, for example, to find how the success of risks may be anticipated based upon the success of similar risks. A further aim was to find new variables and methods which would assist an admission officer in the selection of potentially successful risks. In other words, having defined certain students as risks, the goal was to select those who were not risks after all in a college such as Brown. Recommendations are not made concerning the non-risks although their relative success is often reported.

The amazing absence of studies of success beyond graduation from college is of itself a phenomenon. Industry could not survive were it so totally uninterested in examining the worth of its products. The cost of undergraduate education is typically a five figure amount. The costs of education that precede and which may follow may also be five figure amounts. When multiplied by the millions of students, it is apparent that education per se may be the largest industry in the United States, variously estimated as costing between nine and eleven per cent of the gross national product. Yet, there would appear generally to be a gullible public acceptance of educators' products, and that high school diplomas and college degrees are above reproach, sufficient unto themselves as criteria of the success of students. It is not surprising, then, that such little attention has been given to success other than that of the immediate acquisition of academic grades.

The typical prediction model, with standard predictors of scholastic aptitude test scores and high school grades or rank in class, makes use of Grade Point Average at the end of one or two semesters in college as a criterion of success. It is no wonder that there is a consensus with respect to these studies; they have been so highly repetitious. Even if academic achievement in college were all important, it would be reasonable to expect a few more studies with graduation as a criterion; yet they are not easy to find. Studies of real life success beyond college are practically non-existent. Hoyt's review (Hoyt, 1965) of the few that he found resulted in a conclusion that academic success in college has only modest correlation with adult success no matter how defined. Yet, the focus of attention of admission officers would appear generally to be that of student capability to achieve grades in the first year or so of college, in other words the logical extension of high school. Given the current trend toward elimination of grades both at the college and high school levels, there is an immediate need for worthwhile research with success criteria other than grades. This paper is intended in part to meet that need. Although results pertaining to Grade Point Average for the first semester in college pervade the study, because the statistic was available, such a criterion was considered to be secondary. The criterion of graduation was not that of graduation average but that of the fact of graduation.

It is easy to talk about success but remarkably difficult to define it. It is somewhat like electricity; everyone knows what it feels like and many of its properties are known, but nobody can get hold of it. Success is also quite relative; success for one is often considered to be failure for another. The suggestion that it may be defined through the acquisition of diplomas has obvious shortcomings, not the least of which is that having a diploma is no sure guarantee of other success. It is not so long ago that possessing a high school diploma was a status symbol, which then became the baccalaureate, then the master's degree and then the doctoral degree. Presumably when the PhD becomes too popular, post-doctoral studies will lead to a super doctorate yet to be invented, ad infinitum. This may be hyperbole, but since such would appear to be the trend, attainment of an advanced degree was made yet another academic criterion of success (modified to that of having entered graduate school for the most recent classes, for whom insufficient time had lapsed for attainment of an advanced degree).

If, then, the acquisition of diplomas measures merely a single dimension of success, the inference is that success is a global concept. The problem of criterion selection historically has been that of trying to define it in terms of single dimensions, such as financial reward, about as vague a definition of success as it is possible to conceive. Such a criterion usually puts the vast majority of the service workers such as teachers, ministers and public service officials into the domain of the unsuccessful. It was for this reason that the writer chose to build a multiple model of success moving from the outside quantifiable measures of success to a more subjective and global rating. The essential element was that of reputation for success, the premise that if people think a person is successful, he probably is. A sample of alumni were determined by one or more criteria as successful people through the judgements of peers 15-17 years beyond graduation from college. Such a criterion was available only to members of the Classes of 1950, 1951 and 1952, and it came closest to identifying itself with the historical purpose of Brown, that of "preserving in the Community a Succession of Men duly qualify'd for Discharging the Offices of Life with usefulness and reputation". It would be valuable to know the extent to which higher selectivity in admission procedures has assisted Brown to achieve its historical purpose. If it were found, for example, that students admitted with lower credentials were as successful several years beyond the completion of formal education as those with higher credentials, then it would be revealed that an admission policy can call for lowering as well as raising the selectivity of students without lowering its standards or hurting its image. Such a finding would be important for the future of a private college.

Another global rating of success in this report is that of occupational level. Recent years have seen the development of occupational interest inventories as instruments for vocational guidance. Were such non-academic data found to discriminate between graduates and non-graduates, those known to have attained an advanced degree and those not known, those rated as successful 15-17 years beyond graduation and those not rated, and in particular between levels of occupational success, a valuable new dimension would be revealed for interest inventory scores. On the other hand, if such data were found not to discriminate between success groups, which would lead to the conclusion for this study that their value lay only in occupational classification, and at the same time traditional academic and the experimental non-academic variables were found to discriminate then the worth of interest inventory scores for admission purposes would be subject to serious question.

To the extent that an admission officer should be concerned with the eventual occupations of candidates for admission, occupational success was relevant to this study. The only real criterion is a long-term one. A study too close to the graduation of a class would lack validity of occupational groupings; for example, pursuit of a law degree in no way guarantees pursuit of a legal career. Some years have to pass before "true" occupation is validly determined. For this study the occupations on record 15-17 years beyond graduation from college were used. Three levels of occupational success were developed within three occupational clusters: Scientific-Technology, General Culture and Business.

It makes little sense for a college student to be told that an interest inventory supports his wish to pursue a particular profession if he cannot get the professional education to arrive there. That he has the will to succeed is of little avail, if he is faced with a "closed shop". It makes less sense when there is a shortage in a specific occupation (at the time of writing medicine would be an example), if there is a pool of young people denied the opportunity to enter that domain because they fall short of arbitrary cutoffs on admission scores and other credentials. It makes even less sense if the people who are setting these so-called standards would themselves have fallen short of the standards they seek to impose upon the youth of today. It is a commonly held misconception that since nearly all youth today get a high school diploma and that about one-half of the graduates go to college, that somewhere along the line there must be dilution. The vastly increased numbers of college graduates has made for more applications for professional schools in the same way that more high school graduates made for more applications to college. The parallel result has been that particular types of graduate schools like particular colleges can be highly selective by virtue of the numbers from whom they have to choose. That certain standards required for the pursuit of law, medicine or other professional schools do not necessarily coincide with the optimum standards which would make for success within the professions, appear to be secondary. That many eminently successful members of the professions may have been denied the opportunity to pursue their professions had they had the ill luck to be born one or two generations later, would also appear to be secondary. For these and other reasons, an occupational study delimited to risk samples was considered to be important.

Finally, in studies delimited to Classes 1966-1968 and cross-validated on the Class of 1969, types of risks defined by multiple criteria were examined for information concerning them and of value to an admission officer. Underachievers and overachievers were defined by way of College Board scholastic aptitude and achievement test scores, a procedure which made for such classifications with the frame of reference all applicants for admission independent of the individual's high school transcript. The basic hypothesis was that those defined by such data would be found in fact to be underachievers and overachievers respectively in college. If the overachievers were identified as a group which could succeed although their "academic qualifications were less than first rate", a goal of the study would be further met. Since it was assumed that they would be of high motivation and success orientation, and since certain degree programs, particularly the Bachelor of Science programs, call for such personal qualities, it was hypothesized not only that overachievers were more likely than underachievers to opt at entrance for such demanding programs but also that they would stay with them to attain the degree. Another type of candidate for admission with either the SATv or SATm scholastic aptitude test score excessively (about

150 points or so) imbalanced with respect to the other, was examined for the possibility that having one score considerably lower made him a risk. It was hypothesized that the matter of degree choice would be important, that those with SATv in excess would be realistic in choosing the arts and those with SATm in excess realistic in choosing the sciences. The final type of risk studied moved away from statistically controlled procedures using College Board scores to those clinically defined by an admission officer on the basis of his experience. Their study was not limited to their success but also included an examination of their composition in terms of the other risks of the report to determine the extent to which an admission officer intuitively chose similar types.

Financial Support for the Study

A study was first considered by President Barnaby C. Keeney in 1962, and a proposal with a budget was submitted to the Ford Foundation by the Director of Admissions, Mr. Charles H. Doebler, IV. The request was approved together with a grant for $155,000 to assist in financing the study for a period of seven years and for the dissemination of a report.

The revised design appropriate to this report was submitted to the Ford Foundation after the writer joined the project. No additional financial assistance was sought, and the request that the period of research be extended six months to the spring of 1970 was approved with acceptance of the new design, June 1967.

CHAPTER II

SUMMARY OF FINDINGS

This chapter contains an overview of the major findings and conclusions derived from an experimental study to develop criteria and instruments for the selection of potentially successful risks. Since a single statement would be overly long and probably confusing, the chapter is divided into several individual summaries.

Part One: The Non-Academic Variables

A major aim of the total study was to find non-traditional measures to supplement traditional academic pre-admission data or to modify traditionally collected information in a more objective form. Research of recent years has subscribed to a theory that personal characteristics are as valid or more valid predictors than more subtle personality scales. For this study, attention was turned to the forms which are normally submitted as part of his credentials by a candidate for admission. The procedure was that of organizing, adding to and quantifying the kind of information that admission officers have found to be useful. The writer also brought the experience of several years as a Director of Guidance at the high school level, including college placement.

Four non-academic variables were proposed for recent classes: an Admission Index, based upon counselor ratings of motivation and promise found in the secondary school record used by a group of colleges including Brown; an Environmental Index, consisting of parent-home-school-community items of personal characteristics such as are found in the Personal Information Form submitted by a candidate for admission to Brown; and two activity indices of "doing" and "joining" activities derived from a survey of activities and accomplishments in a high school. Proximate variables were derived from information that was available in the folders of members of Classes 1950-1952. Throughout the studies the non-academic variables were analyzed for their specific properties and in particular for their potential to perform within samples of risks. The aim was to find variables which would assist in the selection of risks who may be expected to be successful. The use of such non-traditional variables would be supported if they could be shown to be discriminating between successful and less successful groups. Some of the major examinations were: the extent to which the proposed variables would add to the variance accounted for by traditional academic variables; the possibility of deriving a non-academic function from which to predict graduation, and comparison of its worth with an academic function made up of traditional variables; whether such variables would discriminate significantly between successful and less successful groups defined by graduation, attainment of an advanced degree, being rated successful by reputation 15-17 years beyond graduation and levels of occupational success. Also, the validity and reliability of such variables would be examined.

Admission Index

Recent years have seen the growth of the profession of counselors, and the findings of this study would appear to support the worth of their professional judgments of the promise of students. The experienced counselor, ideally, does not report his single opinion, rather a synthesis of the several opinions of people who have worked with the students over a period of time. A definitive study of the worth of such counselor ratings as predictions of the success of students was much needed. The examination of the Admission Index was an indepth study of this with the focus upon prediction in a risk population. A summation of counselor ratings of motivation and personal promise, as proposed for the recent classes in this project, is recommended to admission officers as a variable as good or better than those traditionally used from the cognitive domain. When, for example, the Admission Index was introduced into regression analysis along with rank in class, the average of College Board achievement tests and the scholastic aptitude variables SATv and SATm, it added significantly to the variance accounted for by the first two and outranked the scholastic aptitude variables.

A similar variable to the summation of counselor ratings was created for Classes 1950-1952 from ratings made by three people at the time of application of the students. Typically the three raters were the school principal, a teacher and another person chosen by the candidate for admission. Validity studies supported that indices derived from the sets of ratings of Classes 1966-1968 and Classes 1950-1952, about 16 years apart, were essentially the same variable. Regardless of sample, the discriminative properties were comparable. In other words, if counselors did a good job in predicting the success of the students of recent classes, so also did the three raters chosen according to the procedure a generation ago. The findings strongly support that such human judgments are valid.

It was hypothesized that the Admission Index would be somewhat independent of ability, on the premise that such ratings afford the counselor the opportunity to make independent and objective judgments based upon his experience with the student. There would be little point to his merely duplicating ability data which is already available to an admission officer. In the case of the older classes ability data would not even be available to many of the raters. The index was found generally to correlate higher with variables of high school achievement than with variables of aptitude. In both distribution and performance it was most like rank in class.

A premise which underlay the construction of this index was that in the fullness of time success may well be as much related to the impression that is made upon a person in the position to advance an individual as it is upon his actual achievement. The high school counselor is asked to provide estimations of the motivation and academic and personal promise of candidates for admission to college. Were such ratings found to be discriminators between successful and less successful groups defined by success criteria beyond college, valuable new dimensions would be revealed for them. For the total samples of accepted non-veterans (N = 1222) and veterans (N = 1275) of Classes 1950-1952, the Admission Index created from ratings significantly separated graduates and non-graduates, those known to have attained an advanced degree and those not known, those rated as successful by reputation 15-17 years beyond the graduation from college of these classes and those not so rated. The last criterion of success was not possible for Classes 1966-1968, but the Admission Index derived for these classes from counselor ratings separated graduates and non-graduates, those known to have entered graduate schools and those not known, in the total sample (N = 1616).

Further, when the three samples were delimited to verbal risks only, the Admission Index significantly separated those who would graduate from those who did not, those known to have attained an advanced degree from those not known, and, in the case of Classes 1966-1968, those who entered graduate school from those not known. For the non-veterans of Classes 1950-1952, it also significantly discriminated between those risks rated successful 15-17 years beyond graduation from college. The verbal risks were also divided into three occupational groups, science-technology, general culture and business, on the basis of what were considered for this study to be their ultimate occupations, being those on record 15-17 years beyond graduation from college. Not only did the Admission Index significantly separate the three occupational groups but also ordered them on a continuum with the mean for the science-technology group highest and the mean of the business group lowest. Since the index was postulated also to be a variable which measures motivation, such a finding would suggest that generally those who eventually entered science professions were those more highly recommended and highly motivated, and those who eventually entered business were those less motivated and less recommended on the basis of their high school experience. Further, three levels of occupational success were also determined on the basis of known job status 15-17 years beyond graduation. The Admission Index not only significantly separated the three levels of occupational success but also ordered them on a continuum of high-middle-low means corresponding to the levels. Such a finding indicated that those most highly rated for their promise at the time of application to college were also those most likely to have attained a high level of occupational success 20 years or so later. This finding, together with the findings for the criteria of graduation, attainment of an advanced degree or entered graduate school for recent students, and reputation for success 15-17 years beyond graduation from college, strongly support the discriminative quality of the index as a success predicting variable and that it would provide additional valuable information to an admission officer at the time of decision making with respect to applications for college. Further, that it was found to be discriminative in samples of risks, for whom prediction is usually more difficult, not only enhanced the value of the index but also met one of the aims of the project, to create new variables to assist in the selection of potentially successful risks. Since for all success criteria a higher mean was always associated with a more successful group, ratings of students made at the time of their application for college appear to be estimates of success up to 20 years or more beyond their immediate need for admission purposes. Therefore, admission officers who make use of counselor ratings may claim not only that in using them they bring the high school counselor more fully into the decision making process but also that their concern is beyond the immediate criterion of academic success in college.

Environmental Index

The consensus of research is that data of a socio-economic-status type are not only useful predictors of academic success but also sometimes more effective than more subtle personality scales. Further, the very nature of such information provides a valuably different description of the student, and in toto of the student body, not available from traditional objective measures. It was the deliberate intention of the writer to use only the information available on a standard application form, and to organize and to quantify it, rather than to impose upon the admission process batteries of scales or tests not necessarily keyed to admission decision making and often burdensome to handle. The content of the Admission Index, previously described, was not new, only the making of a variable from counselor ratings. Again, for the Environmental Index, although several new items were added as a result of a broad analysis of items of student characteristics, the kinds of items chosen were those traditionally found on any college application form as part of the credentials for admission decision making. Such a procedure is highly economical, for the content of the form provides the information that admission officers usually like to have, and the derived scores provide data for statistical interpretation. Further, analyses of items across entering classes would reveal changes in the student body pointing the way to effective administrative action as changes are contemplated. The basic studies of this report became those of analyzing the properties of the scores that were created, in particular as they operated in risk samples, the foci of the project.

A parent-home-school-community inventory was devised with the intention of incorporating it in a revised Brown application form. Three sources of items were used: the traditional personal information form for admission purposes; related items from the College Student Questionnaire; and items from admission and guidance experience. Items which in repeated analyses significantly discriminated between risks and non-risks intuitively defined by the Director of Admissions found that such a risk could be described as follows: on scholarship intending to work more than six hours per week; from schools where less than 50% of the graduating class was college bound; holding his preparation for college in low regard; having a record of academic inconsistency and expecting his greatest problem to be academic or financial rather than social; preferring to be remembered as an outstanding athlete or most popular student rather than as a brilliant student, and in particular enjoying heavy contact sports; watched TV more than an hour per day during his senior year in high school; low interest in modern art and literary, debate, speech and dramatic activities; from a lower socio-economic level; not from a suburb in a metropolitan area of 100,000 or more people; hopeful that he will eventually join a fraternity.

A 24 item full scale was developed from these items, but, for Classes 1966-1968, a modified scale of 12 items was used, being the maximum number that could be determined from the admission folders of these classes. These items were: those pertaining to community; parental education and status; the student's desire for dramatic, literary and debating activities; his liking for contact sports; his scholarship need and his need for work. A proximate variable was created for Classes 1950-1952 from the limited data which had been collected in an initial phase of the project. However, the 1966-1968 and 1950-1952 indices were different, as they may be expected to be. Apart from the limited number of items in the index for the older classes, the nature of them would be expected to be different if, as postulated, such an index were sensitive to the changing nature of student bodies. The classes of the sixties were quite different from those of the early fifties. The father of today's student is more likely to be a college graduate; then he wasn't. The Environmental Index in its most recent form is the recommended index and most appropriate to the admission of current students. Validity was reasonably established in terms of its correlation with verbal facility. Correlations with rank in class and the Admission Index were not significantly different from zero, indicating that it was not a duplicating variable.

The classical test-retest coefficient of reliability was determined by including the inventory as part of the admission credentials of a sample of the Class of 1973. Those who were accepted were asked to recomplete the inventory during the freshman orientation period some eight or more months later. The reliability coefficient of .81 (N = 80) was not only comparable with coefficients of stability in the cognitive domain but also supportive of the absence of a pre-admission attitude that would cause candidates for admission to make different responses before and after acceptance.

To be of value in this project and eventually to an admission officer such an index needed to be discriminating between successful and less sucessful groups. For the total samples of accepted non-veterans (N = 1222) and veterans (N = 1275), the Environmental Index separated those who eventually graduated from the non-graduates, those known to have attained an advanced degree from those not known, and those who were rated as successful 15-17 years beyond graduation from college from those who were not so rated. The results were considered to support the value of a summation of biographical data such as those of family background.

The index in its later and more substantial form for Classes 1966-1968 significantly discriminated between the eventual graduates and non-graduates, also those who entered graduate school and those not known to have entered. A higher mean corresponded to the more successful group, indicating that those who eventually graduated and those who entered graduate school were more likely to come from more fortunate environments.

When the three samples were delimited to the verbal risks only of the non-veterans and veterans of Classes 1950-1952 and Classes 1966-1968, the index discriminated between all who eventually graduated and the non-graduates, all known to have attained an advanced degree (or entered graduate school in the case of Classes 1966-1968) and those not known, and, for non-veterans only, those who were rated as successful 15-17 years beyond graduation and those not so rated. The significance of the difference between means fell short of significance for the veterans for the last criterion, and such a long-term criterion was not possible for the recent classes.

When the verbal risks were grouped as science-technology, general culture and business, the Environmental Index discriminated between the three occupational groups of non-veterans, Classes 1950-1952, the highest mean corresponding to the scientific group and the lowest to business. Such an ordering of means was similar to that displayed by the academic variables. Although a similar ordering of means was found for the three occupational groups of Classes 1966-1968, the overall F-statistic fell short of significance. Such an analysis was not made for the veterans. Further, when the verbal risks were grouped in terms of high, middle, and low levels of occupational success, the Environmental Index was found not only significantly to discriminate between occupational levels but also to order them with the highest mean corresponding to the highest level. Such a pattern was again like that displayed by academic variables.

The results for the four success criteria, graduation, advanced degree, reputation for success 15-17 years beyond graduation and occupational success, support that a variable such as proposed in this study, being the quantification of such information as parent-home-school-community items, has real value in the admission decision process.

The Activity Indices

The need for a multi-dimensional domain of predictors is well recognized. That academic grades are but one dimension is also recognized. If the movement toward elimination of grades in college spreads effectively to the high schools, admission officers will need to turn to new predictors, unless they wish to rely even more upon such standard tests as those of the College Entrance Examination Board. One of the aims of this project was to seek such predictors, particularly to operate within a population of risks. The activity indices were developed from yet another type of information usually requested of candidates for admission, their non-classroom activities and accomplishments. The procedure for this study was that of organizing such information in an inventory to provide a standard frame of reference for all applicants and deriving scores which could be analyzed, but at the same time continuing to provide the kind of information that admission officers like to have.

Much research in this area has been conducted through the school of Holland and others. They would appear to have established a consensus not only that grades fall short as comprehensive measures of personal competence but also that grades lack relationship with creativity, which may be more important in the long run. These findings justified an examination of involvement in high school non-classroom activities and accomplishments for this report. Such an examination would be valuable to a college whose admission policy called for selecting a "mix" of students, not restricted to finding good grade-getters. Holland and others have developed scales with a limited number of high school activities in such areas as leadership, music, art, drama, speech, writing and science. Usually the scores lack normality of distribution, have a modal score of zero, and the criteria for their analyses were "I can do" items deemed to be real-life accomplishment. The scales have been found to be reasonably valid and reliable.

Two variables were proposed for this report, LAS, a measure of leadership, athletic and social participation and LOMAS, a measure of literary, oratorical, musical, artistic and scientific activities. Such combinations not only made for more desirable distributions, which were still skewed, but also the elimination of a modal score of zero which has plagued related research. The method of data collection for recent classes was to use a 40 item survey of activities and accomplishments in high school, a device which may be easily scored and from which, if desired, an eight factor profile may be derived for its use not only in the admission process but also afterward in the counseling office. The proposal is that this inventory be incorporated in a revised Brown application form.

Proximate variables, called EXC I and EXC II respectively, were constructed for Classes 1950-1952, being the product of the number of athletic activities and their significance on a subjectively determined 0-4 scale of significance for EXC I, and the product of the number of scholastic activities and their significance for EXC II. The two variables were considered to be similar to LAS and LOMAS respectively, but their distributions were more like those of related research, non-normal with modes of zero. Corresponding validity was established so far as this was possible; typically both EXC I and LAS correlated negatively with academic variables and EXC II and LOMAS positively. Not only did such results support a hypothesis that the two variables would act inversely as each other but also they suggested that the types of activities that they represent should be considered as separate entities each having unique properties.

The admission officer, or anyone else, who considers extra-curricular activities in toto as a single dimension not only confounds their value by adding them together but also misses vital information. It was demonstrated more than once, as unreported byproducts to this research, that although the separate variables were significant discriminators between groups, a variable made from their sum lacked the discriminative property.

The classical test-retest determination of a coefficient of reliability was possible for LAS and LOMAS. The survey of activities and accomplishments was included as part of the admission credentials of a sample of applicants to the Class of 1973, and those who were accepted were asked to repeat this during the freshman orientation eight or more months later. Coefficients of stability of .80 (N = 80) for LAS and .84 (N = 80) for LOMAS were not only comparable to those acceptable in the cognitive domain but also supportive of the absence of a pre-admission attitude that would cause candidates for admission to make different responses before and after acceptance.

To be of value for this project and eventually to an admission officer these variables in the form of scores needed to discriminate between successful and less successful groups. Since it was hypothesized that an athletically related variable and a scholastically related variable would act inversely as each other, the further hypotheses were that there would be a negative relationship between EXC I or LAS and success criteria and a positive relationship for EXC II or LOMAS. For the total samples of accepted non-veterans (N = 1222) and veterans (N = 1275) of Classes 1950-1952, EXC I significantly discriminated between those who eventually graduated and did not graduate, between those known to have attained an advanced degree and those not known, and, for the non-veterans, between those rated successful 15-17 years beyond graduation from college and those not rated. It would appear for the old classes that those who eventually graduated, those who attained an advanced degree, and for the non-veterans, those who were rated as successful by reputation 15-17 years beyond graduation from college, were those less involved in high school athletics. A higher mean score was found for the veterans who were rated successful, but such a result may have been due to impediments of data collection. Successful veterans completing their application forms several years after high school may have later held athletic activities in higher regard, or, peers in rating the success of veterans may have remembered best fellow classmen who were most prominent in college, and athletic veterans may have been most prominent. For the recent classes, the athletically related variable, LAS, significantly discriminated between those known to have entered graduate school and those not known to have entered, the former being those less involved in high school athletics, but when the criterion was that of graduation, the results fell short of significance.

For the index of scholastically related activities, EXC II or LOMAS, although, as hypothesized, higher means were associated with those who attained an advanced degree and those who were rated successful 15-17 years beyond graduation, the results were different for graduation. For both the non-veterans of Classes 1950-1952 and Classes 1966-1968, a higher mean was associated with the non-graduates. The activities that made this index have been called "joining" activities as opposed to "doing" activities associated with leadership-athletic-social involvement. The results suggest that the eventual non-graduate may be more likely to "stack the deck" with such "joining" activities, but that for criteria beyond graduation from college more successful people may be those who were sincerely involved in a larger number of such activities in high school.

The focus of the study was upon risks; would similar results hold for samples of verbal risks? For the non-veterans of Classes 1950-1952, lower high school athletic involvement was found for the graduates, for those who attained an advanced degree and (without significance) for those rated successful 15-17 years beyond graduation from college. The results for the veterans lacked significance. For Classes 1966-1968 lower athletic involvement was significantly associated with those known to have gone to graduate schools, and (without significance) the graduates. The results for EXC II and LOMAS were not nearly so decisive. As for the total samples, higher means were associated with those who attained advanced degrees and were rated successful and lower means with the graduates, but only two sets of results were significant. Veterans who were rated successful had higher EXC II means and verbal risk graduates of Classes 1966-1968 had lower means. The overall results for the activity indices were not as decisive as those for the Admission Index and the Environmental Index. As for the veterans, members of Classes 1966-1968 were asked to recall their activities several years after leaving high school, and the results for these groups may have reflected this. Continued research of these variables is proposed for subsequent classes, for which the data have been collected.

A further criterion of success, examined for the verbal risks of the non-veterans only, was that of occupational success. Three levels, high, middle and low, were defined, and not only did the athletic variable significantly discriminate between them but also with an inverse order of means, those of highest level having the least mean. In other words, those rated on the highest of three occupational levels 15-17 years beyond graduation from college were most likely to have been less involved in athletic activities in high school. For both the verbal risk non-veterans and the verbal risk of Classes 1966-1968, three occupational clusters were also determined, those of Science-Technology, General Culture and Business. The athletically related activity variable was found not only to discriminate between the three groups but also with lowest high school involvement associated with Science-Technology and highest high school athletic involvement with those who entered Business. The results for a variable of scholastically related activities were not decisive in any of the analyses. When the samples were those of verbal risks a consensus was established that more athletic involvement in high school was not necessarily a positive characteristic, since scores derived from such involvement were generally negatively associated with the success criteria of this study.

Part Two: Criteria of Success

Graduation as a Criterion of Success

The adoption of a criterion of graduation for the prediction model rather than a traditional one of grade point average at the end of one or two semesters is a proposal for colleges such as Brown, supported not only on practical grounds but also by the findings of this study. Insofar as traditional pre-admission data such as rank in class and College Board scores are concerned, presumably more than a few colleges like Brown have plateaued. For them, prediction equations derived from the data of criterion groups of graduates would not be obsolete when applied to incoming classes as they could be for colleges still passing through increasing selectivity from year to year. A second practical ground for shifting the criterion from an early academic average in college is that if the trend toward elimination of grades continues, then such an average is going to disappear. Further, when academic average was the criterion and the model that of regression analysis, the dropouts were lost from the criterion group. For these and other reasons the model of multiple discriminant analysis was adopted. The criterion became the fact of graduation, and the prediction became that of being classified to look more like a graduate or more like a non-graduate.

Such a criterion is a perfectly desirable criterion for the academic success of a risk. What more can a college expect as a justification for its policy of accepting risks than that they graduate? The older classes of this study were those which entered Brown in the years immediately following World War II. Returning veterans, many of whom may not have considered going to college prior to the opportunity that came their way through the GI Bill, were risks several years removed from their secondary education, often married with families and working along with their academic studies. When the basic academic pre-admission data of the veterans were analyzed with the data for the younger non-veterans admitted directly from high school, the differences were significant, in every case at the 1% level, for rank in class, high school average, the scholastic aptitude variables SATv and SATm and the local prediction of grade point average for the first semester at Brown. Yet, the veterans and the non-veterans had identical grade point averages at graduation, and the difference in the proportions of graduates was only 4.4% in favor of the younger ones. The veterans of higher verbal ability (SATv over 480) were quite competitive with their younger peers (SATv over 500) implying that returning veterans of substantial verbal ability did not suffer academically by being removed for several years.

The findings by consensus in this report are that graduation of itself is the key to further success. Of all members of Classes 1950-1952 rated successful by reputation 15-17 years beyond graduation, over 90% of the non-veterans and over 80% of the veterans graduated. If graduation were not a factor then similar proportions of those not rated successful would have been graduates, but the proportion of them was 60-70%. Further, it was found that it did not matter whether the graduate were a non-veteran or a veteran, whether he were of higher or of lower ability, once graduated, the probability of his achieving such a rating of success was about equal. The importance of this finding is pointed up by the closeness in the proportions of graduates in the older veterans (69.5%) and the younger non-veterans (73.9%) of Classes 1950-1952, and the proportions within the samples of higher and lower verbal ability, respectively 77.1% versus 70.3% for the non-veterans of Classes 1950-1952, 75.4% versus 63.6% for the veterans of the same classes, and 84.3% versus 79.6% for the recent classes of 1966-1968. Since the critical points of SATv which defined the verbal risks in all cases approached the mean scores for the classes, the probability of graduation from Brown was almost the same for those who presented SATv scores below the mean at the time of admission as it was for those who presented scores above the mean. Clearly, if graduation is a desirable goal for a student accepted to Brown, and if one of the uses of the verbal scholastic aptitude test of the College Entrance Examination Board is to assist an admission officer in discriminating between those who may or may not graduate, then it would appear to be a variable of limited usefulness in this regard. Such a finding supports those who believe that the trend of the last decade toward rigorous admission requirements calling for high selectivity by such scores is not only wasteful but also short-sighted.

The weakness of a criterion of graduation average was demonstrated by analyzing the verbal risks of Classes 1966-1968 in terms of four groups, those with a graduation average in excess of 2.75, those between 2.25 and 2.74, those less than 2.25, and the non-graduates. A descending order of means for graduates was found for rank in class, verbal scholastic aptitude, and the average of the College Board achievement tests. The means of the academic variables for the non-graduates in all cases, however, far from continuing downward the descending order of means, without exception found the non-graduates looking more like the middle of the graduates, confirming a finding by Griffin in an earlier study (Griffin, 1965). Deans have always known that academic failure is not necessarily the reason for withdrawal from college. It is just as likely to be due to health, financial problems, disillusionment or a personality factor. Such an analysis pointed up the weakness of academic variables for clearly they also lacked the property of discrimination when the criterion was the fact of graduation. However, collective introduction as variables into multiple discrimirenant analysis, which maximized their individual power to separate groups, resulted in significant separation of graduate and non-graduate centroids. Significant separation was also found when the variables were rank in class and the two scholastic aptitude variables for both the non-veterans and veterans of Classes 1950-1952.

An important part of this paper was to find new variables of a non-traditional nature which would be discriminators between successful and less successful groups. The consensus of research is that academic predictors are usually best for academic criteria. However, the focus of this study being a risk population further narrowed the ranges of academic pre-admission data in already restricted populations. The four non-academic variables, the Admission Index, a measure of counselor ratings of motivation and promise, the Environmental Index, a measure of the parent-home-school-community environment, LAS, a measure of "doing" activities in high school such as leadership-athletic-social participation, and LOMAS, a measure of "joining" activities in high school such as oratory, music and art, were analyzed in terms of the three graduate groups defined by level of graduation average and the non-graduates. *Overall significance with a descending order of means of the Admission Index continued into the non-graduates. Such a finding for verbal risks not only suggests that counselor opinions may be superior to such objective measures as rank in class and scholastic aptitude test scores but also supports the findings of the Eight Year Study that the recommendation of the school is a sufficient recommendation for college*. Those who are concerned that the elimination of grades will spread to the high schools to make difficult the selection of students for college should take heart from this finding. Though nearly two generations have passed and colleges such as Brown have become so different and so selective, the finding of the Eight Year Study still holds; the school official is validly able to rate the promise of students on the basis of his experience with them. It is the recommendation of this report that even closer attention should be given by admission officers to such ratings.

The Environmental Index clearly separated all graduates from all non-graduates in the verbal risks, and a descending order of means which continued downward into the non-graduates was also found for the four groups. The results of this analysis fell short of significance, but its property of discrimination was still superior to that of any of the academic variables. Such results implied that those with higher graduation averages were more likely to come from environments more conducive to academic success, and the non-graduates were more likely to come from less fortunate environments as indicated by the Environmental Index of this report.

An inverse order of means was found for LAS, the variable of leadership-athletic-social activities. Ascending means were found to be associated with the three groups of graduates defined by descending graduation averages of college grades. In other words, those who graduated academically most successful at Brown were likely to have been the least involved in such participations in high school. An athletically related variable would appear to have been inversely related to academic achievement, as it was hypothesized to be. However, the mean of LAS for the non-graduates acted like the means of the academic variables in that it looked like the middle of the graduates. It is interesting to speculate whether such a finding reflected the coaching of athletes.

Though there was not a neat pattern of ascending or descending means for LOMAS, the index of "joining" activities, the mean for the non-graduates was appreciably larger, significantly so when the analysis was made for all graduates and non-graduates. Such a finding supported its value for the multiple discriminant analysis. Students say that admission interest in such activities makes them join, and that makes hypocrites of them; this finding suggests that it does more than that, that candidates for admission who "stack the deck" with such "joining" activities are more likely to be those who will not graduate.

All four variables were introduced into multiple discriminant analysis to effect a non-academic discriminant function for the verbal risks of Classes 1966-1968. Significant separation resulted for the graduate and non-graduate centroids. Similar analyses using proximate variables were made for the non-veterans and veterans of Classes 1950-1952, and the former was also successful.

The crux of this research was the extent to which non-academic variables would be as predictive as academic variables when the criterion was an academic one, in this case the fact of graduation. For all analyses, non-academic and academic, the procedure was to effect the equations on random samples of two-thirds stratified by class and to cross-validate on the remaining one-third random sample, examining those who would have been classified as graduates and non-graduates against the numbers who actually were. Overall hits for the academic function, where a hit was either a graduate or a non-graduate, were about the same, slightly favoring the academic function for the non-veterans of the old classes (59% versus 54%) and the non-academic function in the recent classes (63% versus 57%). However, in the admission situation, the admission officer is most concerned with the probability of success of those who are predicted to be successful. The per cents of all who were classified to be graduates and who actually graduated were calculated. The results for the non-veterans were again about even for the academic and non-academic functions (74% versus 72%), but the results for the sample of Classes 1966-1968 (81% versus 90%) favored the non-academic function. The latter result is more relevant to current admission. The finding was that a discriminant function made up of non-academic variables such as proposed in this report not only fulfilled the object of the report to find new means of selecting potentially successful people from a risk population but also improved upon the use of traditional academic variables.

The academic and non-academic discriminant functions were analyzed for the discriminative properties of the individual variables. Of the academic variables, rank in class was found to be strongest separator of graduates and non-graduates in all three samples. The adage that past academic success breeds future academic success was found to be just as true within samples of verbal risks as it has frequently been found for general populations. The Admission Index, the measure of counselor ratings was the strongest of the non-academic separators, closely followed by the Environmental Index, and inversely by LOMAS, the activity index of "joining" activities. A further analysis was made by introducing all eight variables, both academic and non-academic, into multiple discriminant analysis not only to test the separating properties of the individual variables but to test the finding that a non-academic battery was superior. Ranked in order of the power to separate graduates from non-graduates, three of the non-academic variables, the Admission Index, the Environmental Index, and LOMAS, the index of "joining" activities, outranked rank in class. When the discriminant scores of the separate academic and non-academic functions were correlated with the discriminant scores of the eight variable function, that with the non-academic function (.82) was significantly larger than that with the academic function (.58). In other words, when all variables were interacting in multiple discriminant analysis, which maximizes the power of the variables to discriminate between groups, the result was a function which was dominated by the non-academic variables.

It is the recommendation of this report not only that multiple discriminant analysis be more widely adopted as the prediction model for admission purposes but also that variables such as those proposed in this study be created to effect non-academic equations of prediction. However, it is not proposed that a non-academic function should displace an academic function, but rather that there should be two separate equations, an academic one and a non-academic one, since it has been shown that separately they are more valuable than a single function with all variables. The most recommended candidates for admission would be those classified as graduates by both functions.

Attainment of an Advanced Degree as a Criterion of Success

Colleges such as Brown may be considered to be the preparatory schools of the graduate schools. It made sense, then, to consider the attainment of an advanced degree as another academically related criterion in a chain from the high school diploma through the baccalaureate degree to the advanced degree. The criterion for the old classes was that of being known to have attained at least one such degree, and, for the recently graduated classes, that of having entered graduate school.

Though the older veterans had equalized with the younger non-veterans at the time of graduation from Brown, they drew apart with respect to attainment of an advanced degree, the ratio of proportions being more like 2:1 in favor of the younger peers. Although 69.5% of the veterans graduated from Brown, only 18.8% are known to have a degree beyond the baccalaureate. Perhaps the toll in years of military service followed by delayed college education complicated by economic and family needs made ultimate for about 80% of them the attainment of graduation from college, a mere stepping stone for those with the advantage of youth on their side. It is reasonable to infer that the more mature student was highly motivated but immediately goal oriented; he would settle for reasonable *security rather than risk the potentially more rewarding but more dangerous course calling for further delay of career*.

Similarly, though the ratio of the proportions of those who graduated from the higher and lower verbal ability groups approached 1:1, for both non-veterans and veterans the ratio of the proportions of those who attained an advanced degree was more like 2:1 in favor of the higher ability group and for Classes 1966-1968, about 3:2 in favor of those of higher verbal ability who entered graduate schools. *It is an interesting speculation that the requirements of graduate schools may have denied admission to many of those of lower verbal ability who would have wished to continue, although lack of verbal ability as measured by the SATv was no detriment to their graduating from the undergraduate program at Brown*.

However, having attained an advanced degree, for both the non-veterans and veterans of Classes 1950-1952, the proportions of higher and lower verbal ability groups who would be rated successful by reputation 15-17 years beyond graduation from college were not significantly different (54.1% versus 46.8% respectively for the non-veterans and 37.6% versus 41.0% for the veterans). Such an analysis was not possible for recent classes. *It would seem that having attained an advanced degree, the probability of being rated successful several years beyond graduation from college was equally probable for those of higher and lower verbal ability, as measured by SATv*. (The reader should keep in mind that the SATv cutoffs determining the lower verbal ability groups for Classes 1950-1952 were 500 for the non-veterans and 480 for the veterans.) *The results suggest that if requirements for graduate schools deny admission to those who make lower scores on "SATv type" tests, then admission may be denied to many people who can be just as successful in the long run as those who make higher scores*. What are the goals of graduate schools? They, too, would appear to have been caught in the spiralling admission processes which have made for high selectivity on limited traditional data. An outcome of the elimination of college grades could be that graduate school admission officers may increasingly rely upon graduate school admission test scores. The results of this study call for considerable caution in this regard, particularly since verbal and quantitative scores from, for example, the ability tests of the Graduate School Record may be expected to correlate highly with the scholastic aptitude variables SATv and SATm taken four years previously.

The argument thus far has been that attainment of an advanced degree is merely a link in a chain of academic stages from grade school through graduate school, that those who measure lower on tests such as the SATv may be competitive with those who score higher on such tests, and yet low scores on such tests seem to be impediments to graduate school admission. The suggestion is that the whole process is an academic sieve where a finer mesh is employed at each stage. If this be so, then it should be possible to demonstrate that those who attained advanced degrees (or entered graduate schools in the case of Classes 1966-1968) were those who had superior credentials in high school. This is exactly what was found when the pre-admission data of the successful and less successful groups were analyzed. Significant differences between means were found for rank in class for all samples, for high school average for the non-veterans and veterans of the old classes and for the College Board achievement average for the recent classes, and for the prediction of grade point average in college for all samples. Further, those who attained an advanced degree had already separated themselves by the end of the first semester in college in actual grade point average. In other words, the accolade went to those with a history of past academic success.

The non-academic variables for the recent classes and the proximate variables that were created in this study for the old classes were analyzed for all verbal risks known to have attained the criterion and those not known. In all three analyses, for the non-veterans and the veteans and for those of recent classes, the Admission Index derived from counselor ratings at the time of admission to Brown discriminated between groups. *In other words human ratings of academic promise made several years previously were predictive of those who would attain an advanced degree or enter graduate school in the case of recent classes. Such a finding strongly suggests that, similarly, the ratings of responsible college officials are sufficient recommendations for the placement of students in graduate schools*.

Also, with the higher mean corresponding to the more successful group, the Environmental Index discriminated between those who attained an advanced degree or entered graduate school for recent classes. *The finding for recent classes, most appropriate to current admission, was that those who came from environments more conducive to academic success were more likely to attain an advanced degree*. This finding goes hand in hand with the findings for ability groupings, since the Environmental Index has been shown to be positively correlated with verbal scholastic aptitude which determined the groupings. Inversely, an athletically related activity index discriminated between criterion groups. In other words, *those who attained an advanced degree or entered graduate school in the case of recent classes were more likely to be those who pursued less athletically related activities in high school*.

Reputation for Success as a Criterion of Success

Delimitation of the concept of success to single dimensions, such as financial reward, was considered for this report to be too narrow an approach. Even academic success was treated as but one of many dimensions. Success is a global concept, and it may be approached best through multiple criteria. One of two such criteria in this report was that of reputation for success 15-17 years beyond graduation from college, a criterion possible only for the old classes. Since such a criterion may be expected to be somewhat independent of academic aptitude and achievement, one of the values of a study of samples rated successful and not rated successful lay in the examination of the extent to which such success was independent of ability grouping. It also afforded the opportunity to compare the success of non-veterans and veterans several years after college. Further, were the non-academic variables of this study found to discriminate between successful and less successful groups and were pre-admission academic variables found not to be discriminators, valuable new dimensions for the non-academic variables would be revealed with implications for the admission policy and goals of a college.

Samples with reputation for success were determined from three sources for both non-veterans and veterans of Classes 1950-1952. Panels of outstanding fellow alumni who were also original members of the three classes rated their classmates for success on the basis of seven criteria, reputation for success as judged by: academic or research accomplishment; status or position in employment; status in the local community; status in the larger (national) community; contribution of the alumnus in behalf of Brown (an indirect approach which subsumes that loyalty is an expression of gratitude for the success that has been enjoyed through Brown); income; and a catch-all of reputation for success for those regarded as successful but not fitting the other criteria. Since the panel was from New England and could have introduced geographical bias, two other sources were used to offset such a possibility. A search was made of Who's Who and other national biographies to find those whose reputation had brought them to the attention of the panels of judges who collect for such biographies. Finally, a panel of students searched the Brown Alumni Magazine issues since 1960 for those members of Classes 1950-1952 whose write-ups fitted one or more of the seven criteria used by the peers. The samples of those rated successful were all who received one or more ratings of success from any of the sources. Those not rated successful were considered to be the less successful group, not necessarily inferring that many of them were not successful, but that in not having come to the attention of the three sources, they lacked reputation for success several years beyond graduation from college.

Although the veterans had equalized with the non-veterans insofar as academic attainment in college was concerned (mean graduation grade point averages were identical and the proportions of graduates only 4.4% apart), the veterans did not achieve nearly so well when the criterion was that of being rated successful 15-17 years beyond graduation from college. The ratio of proportions was about 5:3 in favor of the younger non-veterans. In other words, academic success was not of itself sufficient for the attainment of a reputation for success 15-17 years beyond graduation from college. Also, when attention was turned to ability grouping, those rated successful in the veterans of higher verbal ability (18.0%) and lower verbal ability (19.3%) and in the non-veterans of higher verbal ability (32.3%) and lower verbal ability (25.9%) approached a ratio of 1:1, though the difference in the proportions was significant for the non-veterans. However, when ability groupings and veteran status were considered together, success significantly favored the younger non-veterans. In other words, being rated successful over the long-term was apparently less a matter of ability as it was a matter of age. The advantage was with the younger graduate.

It has been noted that regardless of ability grouping or maturity of student about two-thirds or more of all groups graduated from Brown, and that ability grouping was important for the attainment of an advanced degree but not necessarily so important for being rated successful several years later. When the graduates only were examined for those of them rated successful, lack of significance was found in the difference of the proportions of both non-veterans (38.5% versus 33.8%) and the veterans (21.0% versus 25.2%). The results were similar for those known to have attained an advanced degree; the proportions rated successful were not significantly different for the non-veteran ability groups (54.1% versus 46.8%) nor for the veterans (37.6% versus 41.0%). In other words, it did not matter whether the GRADUATE were a non-veteran or veteran, whether he were of higher or lower verbal ability, or whether he went on to take an advanced degree, the probability of his being rated successful by reputation 15-17 years beyond graduation from college was about equal. The importance of such findings go beyond their support of a criterion of graduation. They suggest that educators stop and look carefully at selection procedures beyond graduation from college. Those who believe that present policies for admission to graduate schools and ultimately to certain professions actually make for a sizeable loss to society of potential and valuable contributors, will find support in these findings.

An analysis was made of the extent to which pre-admission data available at the time of admission of Classes 1950-1952 might have been discriminating with respect to those rated successful and not rated successful about 20 years later. Examinations were also made of the non-academic variables used in this study. The samples were again verbal risks, the focus of the study. None of the academic variables, rank in class, high school average and the two scholastic aptitude variables, discriminated for the veterans, and only two of them, rank in class and high school average for the non-veterans. In other words, there was further evidence that being rated successful was independent of ability, but, for the younger non-veterans, the results indicated a relationship between academic achievement in high school and being rated successful 20 or more years later. For both non-veterans and veterans, the finding was repeated for academic achievement in college. Those verbal risks who were rated successful 15-17 years beyond graduation from college had already separated themselves on grade point average at the end of the first semester in college from those who were not so rated.

Of the non-academic variables, for both the non-veterans and veterans, the Environmental Index separated those rated successful from those not so rated, the Admission Index derived from ratings of academic promise for the non-veterans only, and the activity indices for the veterans only. Such results would appear to indicate that non-academic variables are somewhat predictive of such success; a more definite analysis was needed. All verbal risks who graduated and attained an advanced degree were divided into those rated successful (N = 63) and those not so rated (N = 65). This eliminated the non-graduate, controlled for ability, and equated for graduation and attainment of advanced degree. Only the Environmental Index for the non-veterans and grade point average in college separated the two groups. In other words, prior to admission an environmental index would have been the strongest predictor of those rated successful 20 years later, and, after admission, grade point average for the first semester in college separated the successful and less successful groups.

Occupational Grouping and Success

A purposeful study of occupations and occupational success may only be possible several years after students enter the world of work. A study of college graduates too soon after graduation from college, would be at best tenuous. A businessman is quite likely to have been to law school. Even attaining advanced degrees in science does not assure pursuit of a science career. It is not unusual for people to sample several areas before settling for one, and many spend the greater part of their working lives in administration removed from the occupation for which they were actually trained. Criteria for this study were established on the known occupations of the members of Classes 1950-1952, 15-17 years beyond the graduation of these classes. This study was delimited to the non-veterans, but certain examinations of data were made of occupational data for Classes 1966-1968 to examine for trends.

Groups and levels were determined from alumni listings of job title, company and address, coding according to the Dictionary of Occupational Titles and using an abbreviation of Roe's procedures which focus upon actual job and level of responsibility. Three occupational clusters were defined: Science-Technology, General Culture and Business, and three levels were established for each cluster: high, middle and low. Part of the sample had received the Occupational Interest Inventory (OII) and part the Strong Vocation Interest Blank (SVIB), making for examinations of interest inventory scores, another type of non-academic variable, in particular for the property of discrimination between successful and less successful groups.

Validity of groups and interest inventory variables were confirmed in that the highest means of all five OII variables (Personal-Social, Mechanical, Business, Arts and Science) and eight of the nine SVIB variables used (Engineer, Physician, Mathematician, Minister, CPA, Lawyer, Office Manager and Life Insurance Salesman) were logically associated with the expected occupational group. The exception was the SVIB variable, Personnel Manager.

Significantly more of the verbal risks (60.0%) than those of higher verbal ability (45.5%) chose a business related occupation. The proportions for General Culture were also significantly different, but reversed, 24.7% of the higher ability groups being in such General Culture occupations as teaching, law, religion, social occupations, entertainment, the arts and writing versus 14.3% of those of lower verbal ability. However, similar proportions of ability groups entered scientifically related occupations, 29.8% and 25.7% respectively. The analysis was repeated, insofar as data were available for Classes 1966-1968, to check if the finding that potential businessmen are more likely to come from those of lower measured verbal ability still held in the different admission situation today. The trend was confirmed in the proportions of those known to have entered either a business related occupation or a graduate school of business with significantly more in the lower ability group (26.2%) than their more able peers (14.5%) Such percentages may be expected to be much larger in a few years, but the trend may not be expected to be much different. On the other hand, a hypothesis that non-graduates were likely to opt for business was rejected; they comprised consistently about 20% in each of the three groups.

A generally accepted finding that those in science achieve top-level positions quicker than those in other groups was confirmed, 60.4% of all verbal non-risks and 73.7% of all verbal risks who rated the highest occupational level being in Science-Technology. On the other hand, only 11.0% and 5.3% respectively were in the business groups, indicating that few businessmen had had sufficient time even 15-17 years beyond the graduation of their classes to have attained the highest occupational level for them.

Attainment of an advanced degree for the verbal risks was found to be more associated with the General Culture group (69.4%) than with Science-Technology (39.4%) and least with Business (13.5%). Those rated successful by reputation were 25.4%, 36.4% and 26.3% respectively. Such results suggested that for both General Culture and Business award of an advanced degree and being rated successful were independent, the degree not necessarily assuring such a success rating for the General Culture group and not being necessary for such success for those in Business. Such a finding for General Culture suggested that attainment of an advanced degree for such as lawyers and teachers was a professional qualification and that "success" called for more than the ticket to a profession.

Interest inventory scores were found to have little value as predictors of graduation, or advanced degree, considered for the professions to be important stages toward ultimate occupational choice and success. Interest inventory scores also failed to discriminate between those rated in the study as successful by reputation in later years and those not so rated. Further, interest inventory scores, deemed to measure strength of occupational interest, did not discriminate between levels of occupational success. Some evidence was found that success was predictable by the OII variables for Science-Technology. This finding in the non-cognitive domain is in line with the general finding in the cognitive domain, where mathematical-scientific achievement is also more predictable than many other subject areas. Generally, however, the use of interest inventory scores in the admission process to help select potentially successful risks would appear to be quite fruitless.

Similar analyses to those of occupational group and level using interest inventory scores were made using academic and non-academic pre-admission data. All traditional academic variables for the 1966-1968 sample and all but SATv for the sample of Classes 1950-1952 significantly discriminated between the three occupational groups. For rank in class, the aptitude variables SATv and SATm, the high school average or the average of College Entrance Examination Board achievement tests and Brown's local prediction of GPA for the first semester in college, the data of the three occupational groups were in the form of continua with the highest means corresponding to science-technology and the lowest to business. Such findings were deemed to support a theory that an academic continuum has been built into occupations and that those who eventually become businessmen are those with a history of relatively low academic achievement brought to the college from the secondary school. The findings for the old classes were confirmed in the sample of recent classes.

The Admission Index derived from ratings of motivation and promise also discriminated between groups, suggesting that those of highest promise at the secondary school level tended toward the sciences and those of least promise at the secondary school level tended toward business. The finding for this index was repeated for the verbal risk sample of Classes 1966-1968.

A similar trend was found for the Environmental Index for the old classes but without significance for the recent classes. An inverse trend for an athletically related activity index found for both the verbal risk samples of the older and more recent classes, suggested that low involvement in athletic and related activities was most likely to be associated with those who eventually entered science occupations, a finding which is logical when laboratory and other time consuming scientific pursuits are taken into consideration. On the other hand, high athletic involvement was associated with those who entered the world of business. The results for an activity index of culturally related activities, considered to be the "joining" activities, were not decisive insofar as their relationship to occupational groupings were concerned.

An analysis of occupational success was possible only for the sample of Classes 1950-1952. Again, not only did the traditional academic data of class rank, verbal ability, high school average and prediction of GPA for the first semester in Brown, significantly discriminate between occupational levels but also with descending means corresponding to levels.

Of the non-academic variables, the Admission Index discriminated between levels also with descending means corresponding to levels. In other words, human ratings of promise made at the time of the admission of students to college were found to be predictive of ratings of occupational success that would be made several years beyond the graduation of the classes to which they belonged. The results for an Environmental Index were similar. Again, the trend for an athletically related variable was inverse implying that those who eventually rate a high occupational level were more likely to be those least involved in such activities in high school and those rated lowest those most involved. In that traditional academic pre-admission data and three of the four proximate variables of the non-academic variables proposed in this report discriminated with respect to both occupational grouping and level of occupational success, they would appear to give more information for admission decision making than interest inventory scores, which were valid only for occupational grouping. However, the possibility of dual prediction would appear to exist, that of occupational classification through interest scores and degree of success through academic and non-academic data, but until a consensus has been established that predictions from inventories are more valid than the specifically stated preferences of individuals, the enormous task of administering and interpreting thousands of interest inventory records hardly seems justified for the minimum usefulness found for them in this study. This recommendation is not intended to subtract from the value of these instruments in vocational and personal counseling, nor does it amount to a recommendation that they should never be given to students. The focus of this study was to examine the success of risks and to recommend new instruments or measures which would assist the admission officer in his choice of risks with potential for success. The finding is that interest inventory scores fall short of other measures predictive of such success, and they are not recommended as additional non-academic data.

Grade Point Average for the First Semester in College

For certain colleges such as Brown, the worth of a criterion of success determined by an academic average calculated from grades made in the first semester in college is secondary, since policy at present calls for the elimination of grades. However, such data existed for the classes of the study, and findings concerning such a criterion may have value outside of Brown.

In all examinations of verbal risks of the old and recent classes, graduates and non-graduates had already separated themselves on Grade Point Average at the end of the first semester in college. (Graduation was also defined by a grade point average.)

Similarly, for all three sets of verbal risks, those who attained an advanced degree (or entered graduate school in the case of recent classes) had separated themselves from those less successful on Grade Point Average at the end of the first semester in college.

An analysis in terms of long-term success was only possible for the old classes. For both non-veterans and veterans, Grade Point Average at the end of the first semester in college discriminated between those rated successful by reputation 15-17 years beyond graduation of their classes and those not rated. However, such a finding could not be considered definitive, since many effects would be operating. When the samples of verbal risks were reduced to all who graduated and who attained an advanced degree, in effect eliminating the non-graduate and equalizing on formal education through the graduate school, Grade Point Average was not a significant discriminator between those rated successful and those not so rated 15-17 years beyond graduation for both veterans and non-veterans. Although the sizes of samples were small, 63 and 65 for the non-veterans, 21 and 32 for the veterans, support was found for Hoyt's suggestion (Hoyt, 1965) that academic grades may have only modest relationship with adult success. In other words, *GPA may be related to academic criteria but not necessarily related to the success which is manifested in the years beyond formal educational processes*.

Grade Point Average for the first semester in college not only separated three occupational groups, Science-Technology, General Culture and Business but also ordered the groups with the highest mean corresponding to Science-Technology and the lowest to Business. In other words those who eventually entered the science fields were those whose academic achievement in college was more likely to be high and those who entered business fields those whose academic achievement in college was more likely to be low. However, a basic hypothesis of this study was that such a continuum has been built-in, particularly through graduate school requirements for the pursuit of degrees necessary for the professions which constitute the occupational clusters. Grade Point Average was also found to discriminate between levels of occupational success several years beyond graduation of the classes with a descending order of means corresponding to levels. In other words, although *Grade Point Average for the first semester in college discriminated between type of occupation in favor of the sciences, those who achieved the highest level of success within occupations were likely to be those who enjoyed higher academic success in college*.

Part Three: Other Risks

Recognizing that risks defined by a single criterion, SATv, were but one of many kinds of risk, several others were examined defined by multiple criteria, the aim being to gather information concerning their success to assist decision making at the time of their application for admission. This was a byproduct study, limited to Classes 1966-1968 with the analyses repeated for Class of 1969 for verification of findings.

Underachievers and Overachievers

Underachievers and overachievers were those whose averages of College Board achievement tests at the time of application to college were significantly lower or higher than predicted averages calculated from a regression equation whose variables were the College Board aptitude variables SATv and SATm. The method made for classification of underachievers and overachievers from standard scores pertaining to the general population of candidates for admission independent of the secondary school record, the frame of reference being the past academic success of students in Brown. About 16% of each type of achiever were defined from the total sample of Classes 1966-1968, and the same equation was applied to the Class of 1969, as it were in a real-life application. Such a design made for samples whose ability variables were not significantly different, but whose academic achievement differences were very large.

The hypothesis that the samples as defined would manifest histories of underachievement and overachievement in college was strongly supported. For Classes 1966-1968, repeated for the Class of 1969, the two types of achievers had separated themselves academically by the end of the first semester in college, the overachievers having a significantly higher grade point average. Not only were the proportions of graduates for the two types of achievers significantly different for Classes 1966-1968, but the proportion in the underachievers (74.4%) and the proportion in the overachievers (88.3%) were respectively significantly lower and higher than the proportion of graduates (81.9%) in the remainder, considered to be the balanced achievers. The same trend but without significance was found for the Class of 1969 samples. In other words, those predicted to be overachievers had a higher proportion of graduates and those predicted to be underachievers had a lower proportion of graduates than the majority group of peers considered to be balanced achievers. The findings strongly supported the validity of their selection.

Significantly more overachievers than underachievers both opted for and found success in Bachelor of Science programs. The majority of overachievers (56.9% for Classes 1966-1968 and 59.7% for the Class of 1969) attained the degree, although their mean SATv and SATm scores were actually slightly lower than the mean statistics for their own classes. More overachievers than underachievers of Classes 1966-1968 were found in the experimental samples to have proceeded to graduate schools. The graduates of the Class of 1969 were too recent for this study.

Clearly, insofar as such groups defined at Brown were concerned, underachievers were an appreciably risky group. On the other hand, if overachievers were called risks on the basis of their relatively low scholastic aptitude test scores, they also represented a type desired to be found for this report, those with potential for success. It is the recommendation of the writer that if overachievers were identified prior to admission, the deliberate recruitment of them and in particular of those wishing to pursue Bachelor of Science programs may well be a fruitful policy for both the admission office and the university.

Holders of Imbalanced Scholastic Aptitude Test Scores

The study of this group was intended to shed light upon those candidates for admission who present scholastic aptitude test scores such that one of them, either SATv or SATm, is considerably in excess of the other. The design allowed for the normal difference between scores found for males. The valid samples had an average difference of about 165 points in the standard three-digit scale for those with SATm in excess and about 80 points for those with SATv in excess. The design made for very large ability differences but equality in academic achievement.

There was no difference between groups in Grade Point Average at the end of the first semester in college. The proportions of graduates were also not different, and they did not differ from the majority of peers considered to have balanced scholastic aptitude test scores. It is reasonable to conclude that insofar as general academic success in college was concerned, applicants who presented highly imbalanced scholastic aptitude test scores were not particularly risk students.

However, it was with respect to degree intention that real differences emerged. More than one-third of those with SATm in excess chose a Bachelor of Science program compared with less than one-tenth of those with SATv in excess. By graduation, about 60% of the former group had either changed to a Bachelor or Arts program or had fallen away from Brown altogether, a record not significantly different from those admitted to similar programs from the majority groups of the same classes. In other words, it was no more realistic for students who presented scholastic aptitude test scores with the SATm excessively larger than SATv scores to believe that they would be successful in Bachelor of Science programs than for those who presented balanced scores. The finding for Classes 1966-1968 was repeated for the Class of 1969, suggesting that secondary school students, high school counselors and college admission officers may be deceived if they believe that such excess of SATm scores over SATv scores is indicative of potential for success in Bachelor of Science programs at Brown.

On the other hand, it was noted that a majority of about 60% of the sample defined as overachievers accepted for such programs from the same classes attained the degree. The findings taken together suggest that overachievers, defined as in this study, are better candidates for Bachelor of Science programs than those who present mathematical scholastic aptitude test scores excessively higher than corresponding verbal scholastic aptitude test scores. The adage that success lies in "10% inspiration and 90% perspiration" would appear to apply to these programs at Brown.

The conclusion from a Brown admission officer's point of view has to be that *candidates for Bachelor of Science programs who present scholastic aptitude test scores with SATm scores excessively larger than SATv scores are risks*. His job is not just to bring in people who will graduate. It is no consolation for him that dropouts in these programs can move expediently to Bachelor of Arts programs. He is also concerned with the survival of departments, and to this end with the admission of students who will be successful in elected programs. The criterion of academic success for those who elect a Bachelor of Science program is attainment of the degree. If this were not so, the admission officer may well choose different people who elect Bachelor of Arts programs in the first place. On the other hand, about three-quarters of those whose SATv scores were in excess graduated in Bachelor of Arts programs. Clearly, they were more realistic in choosing such programs.

Intuitively Defined Risks

The Director of Admission declared as risks about 10% of each of the Classes 1966 through 1968 on the basis of his examination of their folders after acceptance but prior to entrance. They could be called clinically or intuitively defined risks. A similar sample of about 10% of the Class of 1969 was used as a cross-validating sample. The samples were divided into those who graduated in four years, those who dropped out, and a miscellaneous group who for several reasons were in residence but would not graduate with their entering classes. Although these three groups were significantly separated on Grade Point Average at the end of the first semester in college, only rank in class of academic pre-admission variables (including the prediction of GPA) was a significant separator for the samples of Classes 1966-1968, and none of them separated the groups for the Class of 1969. On the other hand, all four non-academic variables separated the three groups of Classes 1966-1968. The results for the much smaller groups of the Class of 1969 were not decisive. Such a finding for Classes 1966-1968 supports one of the real values of non-academic variables in that *in homogeneous academic situations where academic variables are not able to discriminate, for example between graduates, non-graduates and those delayed in graduation, non-academic variables are not so restricted and fill the void with valuable information for admission decision making*.

Over three-quarters of these risks of Classes 1966-1968 graduated, as did over four-fifths of the risks of the Class of 1969, pointing up not only that admission officers can find risks with high potential for success but also that those declared to be risks can find success. In other words, *the private college can go down as well as up insofar as admission credentials are concerned without seriously affecting the standards of the college*. The importance of this for the study was that nearly 100% of the intuitively declared risks were accounted for by three of the different types of risk objectively determined in this report: those with SATv less than 620 (about 90%); underachievers (about 30%); and SATm in excess (about 24%). The shortcoming of the clinical approach was that it only accounted for some of each type, whereas the statistical methods objectively classified larger groups of all who may be risks in these categories. Further, such classifications can be made and presented to the admission officer as additional and valuable information prior to his decision making.

CHAPTER III

TRADITIONAL VARIABLES, SAMPLES AND DESIGN

The specific intent of this study was to define academic risks and to study those who not only graduated from Brown but also showed indications of being personally successful afterward. If a discernible pattern emerged from the study of the graduates of the older classes, it would then be projected to current Brown classes to see if the pattern continued under existing conditions. New criteria could be proposed on the basis of findings for the selection of students traditionally considered to be academic risks. Recommendations would also be made for the traditional data and their use specifically with risk candidates for admission to Brown.

The original intention was to examine data for Classes 1947 through 1952 and for classes current at the time of the research. In the revised design (June, 1967), the sample of the older students was delimited to three classes, Classes 1950-1952, the other three classes having been admitted during the war years, were too amorphous for worthwhile study. The principal sample of current students, also three classes, were those of Classes 1966-1968. The reader should note that classes are designated throughout this report by the year of their graduation. The reader should also note that the samples are from the male only population of Brown University.

The plan in essence was to define populations of academic risks; to trace the success of those who were successful (in other words not risks at all); to examine for pre-admission characteristics which would have discriminated at the time of admission between those deemed successful and less successful, had such foresight been possible; and to evolve new admission media using these characteristics. Such a plan subsumed that traditional data would also be examined and compared for predictive validity.

The Total Samples

Classes 1950-1952

The determination of the sample of students of Classes 1950-1952, who entered in 1946, 1947 and 1948, had to take several considerations into account. They entered in the years which immediately followed World War II. Two kinds of students were defined, the regularly admitted freshmen recently graduated from secondary schools and averaging 18 years of age and those more mature in age who were veterans. The former are known as the non-veterans throughout the study and the latter assume their usual designation, that of veterans.

The years 1946-1948 were far from normal. Whereas all students today enter in September, about 10% of the Classes 1950-1952 entered in February and July 1946 and February 1947. There were also impediments to the designations, non-veteran and veteran, since about 3% of these classes were Brown students of former classes who entered the services and then returned to finish their education. Instead of today's single college there were then two colleges, The College for regular admitted non-veterans and veterans and a Veterans' College to which veterans only were admitted on approval, their records (or absence of them) being such as to cast doubt upon their acceptance. The Veterans' College held its classes in the afternoon and evening to accomodate those who needed also to work, and it was discontinued from February 1948. A further difficulty lay in class designation. For many years, a Brown student has had the privilege of designating his own class membership; thus a student graduating late may elect either to belong to the class with which he was graduated or the class with which he was admitted. It was finally decided to adopt for class designations the listings in the Alumni records as of January, 1967. It is necessary for the Alumni Office to eliminate members from time to time, for example for those who die to avoid embarrassing mailings, so the maximum count of 3085 is recognized not to be all inclusive. Of these, 199 were transfer students, and they were eliminated since the study was not concerned with the admission of non-regular students. Another 122 veterans failed to meet the condition of approval through the Veterans' College, as a result of which they were never listed as official Brown students in the Historical Catalogue. They were also eliminated. It was also necessary to eliminate 267 who did not have basic data (other than SATv) such as rank in class or a grade point average (GPA) for the first semester in college, or information in their folders from which to create the new variables in the study. These eliminations reduced the sample to 2497 subjects, 86.5% of the maximally determined number of non-transfer students (1222 non-veterans and 1275 veterans). In Chapters IV, V and VI, when the largest count of subjects with data was desirable, the data for these two samples were used for the description of proposed non-academic variables. It was deemed desirable for the critical parts of the study to have scholastic aptitude data for relevance and comparison with the data of current students. These scores were lacking for 370 veterans, so for Chapters VII, VIII, IX and X, total sample sizes of 1222 non-veterans and 905 veterans are appropriate. These represent about 74% of the maximum number considered to belong to Classes 1950-1952.

The lapse of time between high school and college increased the difficulties of data collection particularly for the veterans, many of whom may not originally have planned to go to college. No doubt many school officials were faced with the situation of completing secondary school record forms from inadequate information at their disposal and nobody on the school staff who knew or remembered the former student. In the circumstances the writer feels satisfied that complete data, both academic and non-academic, were collected for about three-quarters of the maximum known number of students belonging to these classes. Basic data for the groups are summarized in Table III-1. Differences

Table III-1

Statistics of Pre-Admission Data and GPA
for Non-Veteran and Veteran Groups
Classes 1950-1952

Traditional Variables#	Non-Veterans N = 1222		Veterans including those without SATs N = 1275		Veterans with SATs N = 905	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
SSR (%ile)	66.14	25.63	58.52	26.10	58.69	26.19
SATv##	50.62	8.55	---	---	48.47	9.61
SATm##	55.11	8.43	---	---	50.06	8.31
HSAV	2.75	0.69	2.56	0.64	2.54	0.64
PSI	2.25	0.48	2.06	0.48	2.08	0.51
GPA	2.08	0.71	2.09	0.75	2.08	0.75

# For explanation of variables see pp.
## Standard scores in two digits

between the means of all pre-admission variables for non-veterans and both samples of veterans were significant beyond the 1% level. However, there was no difference in actual academic performance at the end of the first semester, a finding in itself. It is also clear in the comparison of the veteran groups that the sample with SATv was representative on other basic data. The fact that the veterans obtained equally strong GPA records, although their basic pre-admission data was significantly inferior to those of non-veterans, made them a particularly interesting group to study. A parallel study of the veterans was also justified in the anticipation that there will soon be a new round of veteran applications to colleges.

Classes 1966-1968

Classes 1966, 1967 and 1968, entered in 1962, 1963 and 1964, were selected

2

for the principal sample of recent students being the most recently graduated classes to the writing of the report. A total of 1958 students originallv belonged to these classes. Eliminations were made for the following reasons: missing information on secondary school records, such as counselor recommendations, lack of grade point average at the end of the first semester in college and missing scores such as those of the scholastic aptitude tests, reducing the sample from 1958 to 1871.

Lack of complete follow-up information on these three classes also reduced the sample size for subsequent analysis. Some members of these classes enrolled in five-year programs (AB-ScB). Others did not finish their undergraduate programs in the requisite four years having withdrawn for such reasons as: sickness, leaves of absence for academic reasons, financial reasons, and others. Such students could not be designated as either graduates or non-graduates (the binary classification) and were eliminated, reducing the sample to 1616.

As a final step in data collection, the most recent classes were asked to complete surveys of their secondary school activities and accomplishments by mail. Over 70% responded providing a respondent sample of 1149, the size of the total sample when the activity indices were analyzed. The reader should note that as for Classes 1950-1952 the three classes were pooled to make single samples. Table III-2 presents the comparisons of the traditional pre-admission data of the three groups, the original total with data, the total sample of the study, and the respondent sample. There were no differences on any of the variables, from which it can be inferred that insofar as the traditional academic type of pre-admission data were concerned, both the total sample of the study (N = 1616) and the respondent sample (N = 1149) were representative of the largest possible sample with data.

Table III-2

Statistics of Pre-Admission Data for All with Data, the Total Sample of the Study and the Respondent Sample of Classes 1966-1968

Traditional Variables#	Original Total with Data N = 1871		Total Sample in the Study N = 1616		Total Respondents N = 1149	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
SSR (Std)	63.44	7.64	63.69	7.61	63.88	7.69
SATv##	61.17	7.36	61.38	7.40	61.38	7.31
SATm##	65.52	7.55	65.82	7.52	66.11	7.37
CBAT##	60.82	6.66	60.97	6.72	61.14	6.65
PSI	2.31	0.40	2.32	0.40	2.33	0.40
GPA	2.29	0.67	2.31	0.67	2.35	0.64

# For explanation of variables see pp. 57-61
## Standard scores in two digits

Variables

Basically this was a study of pre-admission data in terms of success criteria in and beyond college. The former were subdivided into data considered to be traditional (such as rank in class, scholastic aptitude and academic success in high school) and the new non-traditional data (designed to be byproducts of the study). It will be seen that the latter resulted in four variables, designated "non-academic", since they were not direct measures of academic achievement and scholastic aptitude. The four non-academic variables, an Admission Index based upon high school counselor ratings of academic promise and motivation, an Environmental Index based upon biographical data of the home-school-community, LAS, an index of involvement in leadership-athletic-social activities in high school, and LOMAS, an index of involvement in culturally related activities in high school, are described in the succeeding chapters in terms of their collection, determination, reliability, validity and their potential for the prediction of success in the total samples of Classes 1950-1952 and 1966-1968. A brief description of the traditional data is justified, since the nature of them changed between the admission of the old and recent classes.

Secondary School Rank (SSR)

This measure is based on the reported standing of the student in his graduating class in the last secondary school attended. It is usually reported in a form such as "3 in a class of 350".

Classes 1950-1952

This rank was calculated as a per cent on the basis of the number of students ranking below the individual. Thus "3 in a class of 350" became 347/350 = .991 giving the student a two-digit SSR of 99.

Classes 1966-1968

The procedure included a correction for continuity after a method proposed by the College Entrance Examination Board (CEEB, 1948). An adjusted rank was calculated according to the formula 2R-1/2N (where R = rank in class; N = size of class). The adjusted rank for "3 in a class of 350" would be 5/700 = .0071. The resulting quotient was an inverted rank which was converted to a standard score of 75 according to a provided table. A few readings indicate the procedure:

Inverted Rank	Standard SSR
.0000 - .0016	80
.0055 - .0071	75
.4802 - .5198	50
.9744 - .9797	30

The standard form is more valuable today in that it extrapolates for the greater numbers of applicants who fall into the topmost two per cent. Correlations between data collected by either method are practically identical.

Scholastic Aptitude

The scholastic aptitude tests (Verbal: SATv, and Mathematical: SATm) of the College Entrance Examination Board have been required of applicants to Brown for a long period of time. The test is so well known that a detailed description is unnecessary. A recent bulletin sent to applicants states that the verbal sections "measure your ability to understand the relationships among words and ideas and to comprehend what you read" and the mathematical sections "measure your ability to understand and reason with mathematical symbols and to use them in solving problems". The reported standard scores (Mean = 500; S.D. = 100) are statistically adjusted in such a way that they are comparable for various forms of the test taken in successive years. The scores indicate a student's aptitude in these areas as compared with the national population of high school seniors taking the tests. All SAT scores in the study were reported in two digits.

It should be noted that the College Entrance Examination Board developed a special Veterans' Test which was taken by many entering students in the 1950-1952 group. Its two scores were stated as equivalent to current SATv and SATm scores and have been so used. It is also recognized that SATm for Classes 1950-1952 preceded the December, 1949 change of form.

Academic Achievement in High School

A high school grade average was collected for Classes 1950-1952 as a measure of academic achievement in high school. Achievement tests such as those of the College Entrance Examination Board were not required of applicants at that time.

Classes 1950-1952: High School Grade Average (HSAV)

Grade average was based on an average of grades in five subject fields: English, Foreign Language, Mathematics, Science, History. Grades in each of the fields were estimated by judgment of the general performance of the student in the area over the four years as shown on the high school transcript (more A's than B's recorded as A, if evenly divided between A and B reported as B, etc.). The grade average was computed by assigning numerical values to the field grades as follows: A = 4, B = 3, C = 2, D = 1, E = 0. High school grades reported numerically were interpreted in terms of the A, B, C, D, E grades, as indicated by the high school.

Classes 1966-1968: College Board Achievement Tests Average (CBAT)

Applicants to these classes were required to take three achievement tests in addition to the SATs. They could choose any three but were urged to take one in a foreign language and chemistry or physics. Brown's Office of Educational Measurement researched these tests for admission purposes and developed CBAT as a useful additional measure which has been found to be an effective predictor of academic performance in Brown.

CBAT is an average of an applicant's scores on all subject achievement tests (generally from three to seven). Only the highest score is used when the same achievement test is taken more than once. It is probable that this average reflects the field interests of an applicant. There is also a possibility that CBAT is an index of maximum performance, since the candidate has considerable discretion in choosing tests most favorable for him. As such it would be expected to have properties which would make it different from either SSR or HSAV; for example, it may be expected to be superior to SSR for a student coming from a highly selective (or intensive) school situation.

CBAT was chosen for the recent classes to replace the high school average of the older classes as a measure of academic performance in high school, not only to provide a second dimension to that of rank in class but also because of its standard nature across the wider population of all candidates for admission.

Predicted Semester I Average in College (PSI)

It has become the practice in many colleges to predict GPA for the first semester in college on the basis of a regression equation using traditional pre-admission variables. The writer was fortunate to have available to him predictions which were actually used at the time of the admission (1946-1948) of Classes 1950-1952, and takes pleasure in acknowledging the pioneer work in this area of Dr. Andrew H. Macphail of Brown. The criterion was that of GPA for the first semester for both samples of Classes 1950-1952 and 1966-1968. Current practice uses the data of a criterion group of the three most recent classes and evolves separate predictions in terms of degrees, from the data of a two-thirds random sample stratified by class, and cross-validates on the remaining one-third. The correlation between PSI and GPA is also checked when actual GPA is available. Generally such correlations are on the order of .45-.55 and higher than correlations between individual measures and GPA which are found in the same correlation matrix. The correlation between GPA and PSI for the 1966-1968 sample (N = 1616) was .52 and between GPA and SATv (.36), SATm (.28), CBAT (.44) and SSR (.39). For the non-veterans (N = 1222) and veterans (905), they were .51, .31, .30, .45, .44, and .44, .32, .33, .35, .34, respectively for GPA with PSI, SATv, SATm, HSAV and SSR.

Classes 1950-1952

Two predictions equations developed by way of multiple regression analysis from data of the Classes of 1943, 1944, and 1945 were used for Classes 1950-1952, for AB and ScB in Chemistry Degrees: PSI' = .0145 SSR + .0275 SATv - 0.1005; and for ScB in Engineering and Physics Degrees: PSI' = .0144 SSR + .0378 SATm - 0.9713.

A substitute equation using an ACE conversion was also developed to be used for those students without scholastic aptitude scores.

Classes 1966-1968

Three equations were developed from the data of Classes 1963, 1964 and 1965, for AB Degree: $PSI' = .0421 (CBAT) + .0242 (Std\ SSR) - 1.7383$; for ScB in Engineering: $PSI' = .0647 (CBAT) + .0158 (Std\ SSR) - 2.7798$; and for other ScBs (Applied Mathematics, Chemistry, Physics): $PSI' = .0664 (CBAT) + .0258 (Std\ SSR) - 3.6829$. In the last equation, CBAT was calculated without the English Composition score.

Semester I Academic Average (GPA)

This is an average of grades in all courses taken during the first semester (A = 4, B = 3, C = 2, D = 1, E or F = 0). The grading system and number of courses taken were the same for both groups (1950-1952 and 1966-1968). Almost all students take four courses; however, some averages are based on three or five courses.

The Non-Academic Variables

Four non-academic variables were developed for this study: the Admission Index, a measure derived from ratings of motivation and personal promise; an Environmental Index, a measure derived from items pertaining to the parent-home-school-community; and two activity indices, derived from a survey of non-classroom activities and accomplishments in high school. These for recent classes and proximate variables for the older classes are separately described in Chapters IV, V and VI in terms of the theory underlying their construction, data collection, validity and reliability, and evidence for their potential as discriminators between successful and less successful groups in the total samples.

The Verbal Risk Samples

The project was basically a study of risks, the significance of whose data may well be lost in the data of the total samples. Several ways of defining risks were carefully explored, and it has been noted that a cut-off on SATv was adopted. The choice fell into line with the original intentions of the study that risks should be academically determined; a cut-off on SATv is a meaningful statistic to admission officers; SATv is an aptitude variable and a cut-off in it amounted to the partial control of verbal ability in the design; SATv is not included in the current equations for the prediction of immediate academic success in college (see PSI); and, finally, it is meaningful to high school counselors and applicants who typically believe that colleges such as Brown deliberately seek students whose SATv scores are high. Most applicants today take College Board tests in the junior year of high school, so from a practical point of view it can be one of the earliest available data describing candidates for admission. An essential concept of the study is not that eliminations should be made because some score is below a statistically defined cut-off point, but that a candidate with such an SATv score should be considered one of a different population to be judged upon the past success of similar populations.

The cut-off was determined by a minimum loss decision, a method recommended by Bogue (Bogue, 1968). The criterion was that of the fact of graduation. Contingency tables (2x2) of predicted graduates and non-graduates (those above and below an SATv score) and actual counts of graduates and non-graduates in the dichotomies of the total samples were analyzed for hits and misses. A cut-off was determined where the proportion of misses was lowest. Three samples of risks, afterward known as verbal risks, were defined through this procedure for: Non-veterans, Classes 1950-1952 (SATv below 500; N = 572), Veterans, Classes 1950-1952 (SATv below 480; N = 450); and Classes 1966-1968 (SATv below 620; N = 812 and N = 577 for the Respondent Sample). The remainders of the total samples were designated verbal non-risks. Descriptions of the verbal risks and verbal non-risks for all three samples by way of traditional pre-admission data are found in Table III-4. The groups were clearly differentiated.

Plan of Research

The original intention for the study was that findings for the old classes would be examined for relevance in studies of current classes to provide leads for decision making policy for the admission of future classes, specifically for those deemed to be academically risky at the time of their application, based on traditional measures of academic potential for college. Essentially, the study was conducted within the spirit of the intention. The key studies were those of the Classes 1966-1968, the most recently graduated classes at the time of writing, and the results for them were compared with the results of studies of either the non-veteran or veteran groups, or both of them, of Classes 1950-1952.

In actual practice, however, the studies did not always proceed logically from the old classes to the new, due to a change of researchers more than half way into the seven years proposed for the project. A modified design was developed calling for major data collection of both academic and non-academic data. The non-academic variables were developed from the data of currently entering classes. The procedure was then to return to the folders of the old classes (or data previously collected) to create proximate variables, to make validity studies, and then to introduce into the design the variables for which validity was established. Usually the study for the non-veterans of Classes 1950-1952 was completed first, then for Classes 1966-1968, and finally for the veterans of Classes 1950-1952. The exceptions to this were that in Chapter IX the study of occupational success was delimited to the non-veteran data, Classes 1950-1952, and in Chapter X a study of other types of risks was delimited to the Classes of 1966-1968 and replicated on Class of 1969 data.

Table III-4

Statistics and Correlation Matrices for Traditional Academic Pre-Admission Data: Verbal Non-Risks and Verbal Risks

Traditional Pre-Admission Variables	Non-Veterans Classes 1950-1952					Veterans Classes 1950-1952					Classes 1966-1968				
	Verbal Non-Risk N = 650		Verbal Risk N = 572		t	Verbal Non-Risk N = 455		Verbal Risk N = 450		t	Verbal Non-Risk N = 804		Verbal Risk N = 812		t
	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
SSR#	70.50	24.37	61.19	26.15	6.41 **	64.06	24.24	53.26	26.97	6.33 **	65.77	7.18	61.62	7.46	11.39 **
SATv	57.00	5.85	43.37	4.28	##	56.06	6.79	40.79	4.67	##	67.43	3.96	55.39	4.61	##
SATm	56.32	8.34	53.74	8.32	5.40 **	51.38	8.54	48.72	7.85	4.88 **	68.56	6.62	63.10	7.37	15.67 **
HSAV	2.88	0.68	2.61	0.68	6.93 **	2.64	0.63	2.44	0.63	4.78 **					
CBAT											64.58	5.50	57.40	5.86	25.36 **
PSI	2.45	0.42	2.02	0.44	17.41 **	2.35	0.43	1.81	0.43	18.89 **	2.52	0.35	2.12	0.34	23.53 **

Non-Veterans Classes 1950-1952

Verbal Risks

	SSR	SATv	SATm	HSAV	PSI
SSR	--	.07	.20	.79	.90
SATv	.15	--	.13	.08	.31
SATm	.21	.21	--	.21	.37
HSAV	.80	.15	.27	--	.71
PSI	.86	.47	.32	.71	--

Verbal Non-Risks

Veterans Classes 1950-1952

Verbal Risks

	SSR	SATv	SATm	HSAV	PSI
SSR	--	.00	.27	.70	.90
SATv	.06	--	.06	-.02	.25
SATm	.33	.04	--	.19	.33
HSAV	.74	.16	.37	--	.58
PSI	.75	.45	.26	.57	--

Verbal Non-Risks

Classes 1966-1968

Verbal Risks

	SSR	SATv	SATm	CBAT	PSI
SSR	--	.13	.22	.22	.62
SATv	.16	--	.23	.37	.32
SATm	.28	.25	--	.60	.48
CBAT	.31	.43	.57	--	.83
PSI	.66	.38	.48	.85	--

Verbal Non-Risks

SSR: % for 1950-1952; Std for 1966-1968; ## basis of dichotomy

Success Criteria

The rationale for the concept of success was developed in the introductory chapter. Five basic success criteria were isolated for this study: GPA for the first semester in college; graduation from college; attainment of an advanced degree; occupational success; and reputation for success 15-17 years beyond graduation from college.

GPA for the First Semester in College

This criterion represented the closest index of accomplishment to that of academic success in high school. Immediate academic success in college after one or two semesters is the traditional criterion associated with studies of prediction. The samples of this study were in part defined on the basis of all who had a recorded GPA, so this datum was always available in all studies, but in this study academic grades are considered to be a minor criterion. Consequently, no single chapter was devoted to the study of GPA for the first semester and findings concerning it pervade the whole report. These are consolidated in the summary.

Graduation from College

The criterion was the fact of graduation. Several reasons underlay the decision not to use an academic average at the time of graduation for any of the studies in this report. This was essentially a study of risks and graduation from college of itself was considered both success and justification for admission. Level of graduation was considered to be secondary. Coincident with this research Brown was undergoing a reappraisal of philosophy underlying undergraduate education, and in the current academic year (1969-1970) considerable modifications not only of curricula and teaching but also grading procedures have been introduced. It was realized that with faculty acceptance of the concept of dichotomous grading (pass/no credit) that a report that was not adaptable to the changes that were taking place would be obsolete at the moment of publication insofar as Brown were concerned.

Since the object was the prediction of group membership, in other words does the candidate for admission look more like a graduate or non-graduate, rather than the prediction of a continuous variable such as graduation average, multiple discriminant analysis was adopted as the prediction model instead of the traditional one of multiple regression analysis. Not only would the latter have emphasized academic averages, which were considered a secondary consideration for this report, but also eliminated the non-graduates. The method became that of creating a discriminant function which maximized the power of the pre-admission variables to separate the groups of graduates and non-graduates in discriminant space. The function, when applied to the pre-admission data of each candidate, resulted in a score which was statistically compared with criterion group centroids to result in a classification of graduate group membership or non-graduate group membership.

Since non-academic variables were to be by-products of the research and report, an important part of the design became that predicting graduation through both academic and non-academic variables, and comparing not only the predictive validity of each type of variable but also the contribution of the individual variables. This was done for the verbal risks of all three samples of the study, non-veterans 1950-1952, veterans 1950-1952 and Classes 1966-1968. The design is more fully developed with the report of the study in Chapter VII.

Attainment of an Advanced Degree

For many students applying to college, undergraduate education is a stage between high school and a graduate school or professional training already in mind. Certainly for many graduates of Brown, attainment of an advanced degree is merely the next and expected link in the chain of academic success. It was for this reason that such attainment was adopted as another criterion of success in this study for candidates seeking admission to Brown. Although the prediction of such success was not considered to be specifically relevant to the study, the sensitivity of the data to the criterion and the extent to which it discriminated between verbal risks who attained such a degree and those who did not were also considered important. Significance of the difference between means was examined by way of t-tests for all samples of verbal risks. For Classes 1966-1968 a modified criterion of having entered graduate school had to be adopted, since at the time of writing, few had had sufficient time to achieve the graduate degree. The study of these classes in terms of success beyond graduation could not be developed as it was for the older classes.

Ratings of Success over the Long-Term

A further criterion of success used in this study was that of being rated successful by one's peers 15 or more years beyond graduation. Such a criterion manifested movement away from the more strictly academic success criteria considered thus far, for example GPA at the end of the first semester in college, the fact of graduation, and the attainment of an advanced degree, although any or all of these could be components of such long-term success, to a more subjective and global rating. Such a long-term criterion was considered most closely to identify itself with the historical purpose of Brown, as stated in its charter of 1764, that of "preserving in the Community a Succession of Men duly qualify'd for Discharging the Offices of Life with usefulness and reputation". The collection of these data is fully described in Chapter VII.

Sensitivity of pre-admission variables to such long-term success ratings would be a valuable determination, in particular to compare the predictive validity of academic and non-academic variables. The latter would assume importance to an admission officer if the academic variables revealed themselves not to be sensitive to such ratings (or less sensitive), when decision making policy is not tied strictly to immediate academic success in college. Significance of the difference between means of pre-admission data for groups defined as those rated successful and those not rated successful over the long-term were examined by way of t-tests for the verbal risks of the non-veterans and veterans of Classes 1950-1952. Such a criterion was impossible for Classes 1966-1968.

Multiple Success Criteria

A pyramidical design was developed to embrace the three success criteria, the fact of graduation, known attainment of an advanced degree and reputation for success 15-17 years beyond graduation from college. On the premise that these criteria were not independent dimensions of success, they were brought together to examine, for example, the extent to which a rating of long-term success was a function of having graduated or having an advanced degree or both. This design underlies most of Chapter VII. It was a total sample study, including both verbal non-risks and verbal risks, and it accounted for both successful and less successful groups. Basically, the total sample of non-veterans (N = 1222) and veterans (N = 905) were subdivided into those successful and less successful on the three criteria, starting with all who graduated and not graduated subdivided into those who attained an advanced degree and those who were rated successful, proceeding to all rated successful and all not rated successful subdivided into those who graduated and who attained an advanced degree, and then to all known to have attained an advanced degree and those not known, subdivided into those of them who were rated successful. One criterion for this study was those who attained all three success criteria, so the final examination became all who graduated and who attained an advanced degree subdivided into those who were rated and those who were not rated successful over the long-term.

The significance of the differences between proportions were examined by way of the chi square statistic.

Since this design included the total samples of non-veterans and veterans of Classes 1950-1952 not only did it compare the relative success of verbal risks and verbal non-risks, non-veterans and veterans, but also it became a follow-up and grand summary, representative of the success of the members of these classes beyond graduation. The design is easily followed if the reader refers to Table VIII-3.

Occupational Success

Alumni records included a local occupational classification, job title, company name and address. These data were classified into three occupational groups, Scientific-Technical, General Culture-Service-Arts and Business Contact-Organization, and also three occupational levels, high, middle and low, making use of the methods of Roe (Roe, 1956, p. 151) and the Dictionary of Occupational Titles (DOT, 1965). The method is outlined in detail in Chapter IX.

Classes 1951 and 1952 took the Lee Thorpe Occupational Interest Inventory (OII) and the Class of 1950 took the Strong Vocational Interest Blank (SVIB). Raw scores of the five fields of interest, personal-social, mechanical, business, arts and science, and the level of interest score from the OII were used as non-academic data. The scores of nine variables in the SVIB, engineer, mathematician, physician, minister, CPA, lawyer, personnel manager, office manager and life insurance salesman, were converted to standard scores using the means and sigmas found in the manual (SVIB Manual, 1940).

The occupational study principally involved the non-veteran verbal risks of Classes 1950-1952. The greatest value of this study was that it was long-term. Classes 1966-1968 were too recent and also affected by United States service requirements of these young men (about one-fifth were in one of the services at the time of writing). It means little, for example, to know that a student is pursuing a law degree or even that he has recently gained one, if there is no surety that he will enter law. The chances are good that ultimately he could be a businessman, or something else. The value of a long-term study is that it is more likely to be a real occupational study, less one of intention than one of fact, reflecting the occupations that students settled into years or more beyond graduation. A corresponding study of veterans was not made.

First the distribution of the raw data was examined in terms of counts by occupational group and level, comparing verbal risks and verbal non-risk occupational patterns. The sample was then delimited to verbal risks, the focus of the report. The validity of interest inventory scores was first examined in terms of the three occupational groups, the principal technique being that of analysis of variance, for example the highest mean on a business related variable would be expected to correspond to the business group. Analyses of the OII and SVIB data were conducted in parallel. Having established validity, the procedure was then to turn to the more important analyses, insofar as this study was concerned, those of interest inventory scores as discriminators between successful and less successful groups defined by the four success criteria, graduation from Brown, attainment of an advanced degree, reputation for success 15-17 years beyond graduation from Brown, and levels of occupational success.

A parallel analysis of traditional pre-admission academic data and the proposed non-academic variables of this report was made in terms of both occupational groups and levels, and the results compared with those for interest inventory scores.

Other Types of Risks

There are many definitions of risk, and that adopted for the major part of this study, a cutoff on SATv, was acknowledged to be only one of them. Several other types, defined by multiple criteria, were examined, and the results are reported as a final chapter. These studies were delimited to Classes 1966-1968 and repeated for the Class of 1969. The types of risks were: underachievers and overachievers; those with imbalanced scholastic aptitude test scores, both SATm in excess and SATv in excess; and risks intuitively defined by the Director of Admission.

Underachievers and Overachievers

Underachievers, defined as those whose academic achievement scores were not commensurate with their aptitude scores, were defined as all those whose actual CBAT scores were one Standard Error of Estimate below predicted CBAT scores (CBAT') derived from a regression equation consisting of the aptitude variables SATv and SATm. Overachievers, were defined as all those whose actual CBAT scores were one Standard Error of Estimate or more above CBAT'. Validity of samples were first checked by comparing underachievers and overachievers on basic pre-admission data, both academic and non-academic.

The essential analysis concerned itself with the questions: Are either or both of them risks? Do underachievers and underachievers in high school continue to be underachievers and overachievers in college? To what extent are they stable in regard to originally intended degree (AB or ScB) and what degrees do they opt for? How do they differ in status after graduation? The criterion for immediate academic success was GPA for the first semester in college, examined by way of analysis of variance for all underachievers and overachievers and the graduates and non-graduates of each. As the remaining analyses were non-parametric, chi square tests were used to examine possible relationships between overachievers and unverachievers and indices of success that were available to these classes.

Imbalanced Scholastic Aptitude Scores

A student with a low SATv has been considered a risk but what if he supports such a score with a high SATm and his intentions are scientific? This is particularly appropos to Brown which has ScB and engineering programs. The converse situation of high SATv and low SATm is no less interesting. Are students with imbalanced SAT scores special risks? To what extent does such imbalance become a function of degree choice and to what extent are each successful? Such questions needed answers.

The selection of the samples of those with SATm in excess and SATv in excess is fully described in Chapter X. Allowance was made for the difference between SATm and SATv scores which is normal for males. The samples were from Classes 1966-1968 and the studies were replicated for the Class of 1969 insofar as data was available for these, the most recent graduates at the time of writing. Essentially, the design paralleled that for the underachievers and overachievers with analyses of immediate academic success, GPA for the first semester, and a non-parametric analysis in terms of graduation, degree intentions and outcome, and status post-graduation.

Intuitively Defined Risks

It was the practice for the Director of Admissions to choose on the basis of his experience a sample of risks, deemed to be intuitively defined in that they lacked a common denominator such as all being below a cutoff on SATv. The method, essentially a clinical method, was that of subjectively examining the folders of an entering class and declaring the risks. Unfortunately, this practice began with the Class of 1967 and it was necessary to account for the Class of 1966 not only for consistency in the report but also to get a desirable size of sample. It was resolved, with the permission of the Director of Admissions, that a random sample of one-tenth of the Class of 1966 should be selected from the lowest quintile on PSI. Thus, it is recognized that for the analysis of these risks, the PSI statistic is invalid. A summary of basic data for the intuitively defined risks is found in Table III-5 and it is seen that there is a reasonable consistency in the samples which justified their being grouped as a single sample.

Table III-5

Univariate Statistics of Pre-Admission Data
for Intuitively Defined Risks, by Class,
Classes 1966-1968

Variables	Class of 1966 N = 64		Class of 1967 N = 55		Class of 1968 N = 64		F
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
SSR	55.12	8.15	56.58	8.60	58.39	7.13	2.66
SATv	53.50	5.60	52.20	7.46	53.75	8.08	0.78
SATm	58.22	6.91	57.24	7.44	60.31	7.82	2.68
CBAT	51.50	3.96	52.76	6.01	54.30	6.85	3.77
PSI	1.71	0.18	1.80	0.35	1.93	0.37	##
GPA	1.86	0.45	1.88	0.61	1.77	0.62	0.66

## Invalid, since the sample for Class of 1966 was defined on PSI

The analysis of these risks was essentially descriptive in terms of the proportions of them who were verbal risks, graduates, underachievers, overachievers, possessors of unbalanced SAT scores, AB or ScB intenders at the time of admission, AB or ScB receivers at the time of graduation, and entrants to graduate schools. The samples were divided into three sub-samples, those who graduated, those who did not graduate and those who being still in residence were neither graduates nor non-graduates at the time of writing. Analysis of variance of pre-admission data for the sub-samples would be expected to afford valuable information for decision making policy in regard to such risks. Finally, results would be compared with findings for the other risks of this report, and, as far as possible replication of the analysis of the intuitive risks of Classes 1966-1968 would be conducted on the data of the Class of 1969, the most recently graduated class at the time of writing.

Statistical Calculations

The calculations in this report were made through the services of the Brown University Computing Laboratory making use of programs which had been adapted to the IBM 360 for the use of the Office of Educational Measurement. Organization of data and input were one of the responsibilities of Miss Celeste Griffin.

Randomization

All randomization processes in this project follow the procedures recommended by Lindquist (Lindquist, 1953).

CHAPTER IV

THE ADMISSION INDEX (AI)

Prediction and the Counselor

There is a lack of consensus in research concerning the ability of counselors to predict the academic success of students. Meehl (1957) in a discussion of the use of a prediction formula or human judgment in a clinical situation where a cross-validated formula exists, recommended against human judgment, unless "the psychological situation is as clear as a broken leg". In the school counseling situation, for example when the decision of recommendation of a student making application to college is being made, the counselor rarely has the benefit of formulas, and he must rely upon his own judgment. Millions of such decisions are made each year.

Tyler (1961) stated that counselor prognoses of academic success are not sufficiently accurate safely to base decisions on them. Whately (1966) examined the confidence that counselors place in their own predictions and found that, when the subjects were college freshmen and the criterion over-all grade average, the most confident were least accurate, and the least confident were most accurate. Whately (1967) argued that prediction is basic to effective educational and vocational counseling, and, to the extent that prediction is important, logically, then, a counselor should be able to predict relatively accurately before he is an effective counselor. Whately maintains that prediction is a fundamental part of counseling, and states that little experimental evidence supports the counselor's role in prediction. In this study, he found that a group of counselors, judged by their supervisors as "most effective", on the average predicted correctly that 52 out of 100 students would persist and be academically successful in the educational programs they selected at the time of admission to college. At the college level of counseling, Fretz (1965) asked 27 counseling psychologists of varying experience to read the vocational planning forms for six randomly selected university students who had received counseling in the university counseling center, and to make vocational and academic predictions including final grade-point average. All but one of the correlations between predictions and outcomes were significant at better than the 1% level. It would seem that there is beginning to emerge some evidence that today's trained counselor is a reasonably successful predictor of future performance.

Measure of Motivation for Use in Prediction

Success implies both ability and motivation, and prediction of success implies, at least in part, the assessment of motivation to succeed. Although it would seem obvious that a relation between actual achievement and motivation exists, studies in general have failed conclusively to demonstrate this. One of the problems is that motivation, like success itself, is such a global concept and present methods of assessment are at best very crude. Krumboltz (1957) declared that it stands to reason that a counselor's prediction of client success will be improved to the extent that motivation operates. On the other hand, Krumboltz could find no single instrument that a counselor can use with any confidence that he is measuring achievement motivation. Shaw (1961) found that none of three published achievement scales differentiated between achievers and underachievers in a high school population. Uhlinger and Stephens (1960) noted that the crude state of motivational theory had failed to generate valid measurement operations, and found that only one of four measures supported an hypothesis that high achievers in the sample of 72 very superior college engineers would evidence greater need for achievement than do lower achievers. On the other hand, Weiss et al (1959) found that a combination of ability and motivation measures seemed to be a powerful predictor of the cumulative grade-point average at the end of the third semester in college. Although it is clear that counselor predictions are important and valuable and that counselor predictions have to take into account the motivation of the student, it is also clear, at best, we have only inferior measures of motivation available to the counselor.

Counselor Ratings of Motivation

It is well known that the self-reporting nature of personality tests make them susceptible to response sets such as acquiescence and faking, and, further, that their reliability is a function of the attitudes and feelings that prevailed at the time the appropriate inventory was completed by the subject. On the other hand, counselor ratings of a pupil ideally are the synthesis of the opinions of several people who have worked with a student over a period of time. The student's ego is not directly involved in the ratings as it may be in self-reports, but the impression that he has created. This is an important consideration. In the fullness of time, long-term success may well be related not only to one's accomplishment but also to the impression that is made on those who are in a position to advance the individual.

This chapter is concerned with counselor ratings not only for their predictive potential but also as measures of motivation from which to derive a much-needed motivation variable for guidance at the college level. Whereas a review of pertinent literature has shown that the counselor does not presently have a highly reliable measure of motivation available to him, it is hypothesized that one can be created from counselor ratings for the use of the college admission officer and the counselor at the college level.

Today, the high school counselor usually completes the secondary school record form required by college admission officers in student selection. A copy of the form used by Brown University and certain other colleges is found in the Appendix. Insofar as the counselor completes the form, he may be said to have an integral part in the placement procedure. When he knows the student, the counselor has available to him far more information than ever could be recorded on the form. The counselor is asked to complete a written subjective evaluation of the total student and to summarize this evaluation in the form of objective ratings. What is the best interpretation of these ratings? Should such ratings be considered as something different and apart from other parts of the secondary school record? If they are mere duplications, what is their significance? Surely they do not merely represent ability, because there is usually a wealth of ability data available in scholastic aptitude tests and other scores. The same argument applies to achievement, for the record usually includes a history of grades and achievement scores. It would seem that a counselor would use these ratings as opportunities to express independent judgments of the candidate. What about the student whose ability data are relatively low, but who appears to perform at a superior level; the student of consistently high motivation, persistence, or success orientation? Here is the opportunity for his counselor to give him a desirable boost, because he has an experiential basis for feeling that this young man will be a success in college, and he wants very much to rate him highly on the basis of personal, academic, and other promises. On the other hand, there is the student who has high scores on traditional ability data, but the counselor knows from experience that, although a highly predicted academic average may be found for him, the history of this young man is lack of success orientation and shortcomings that make for an unfavorable prognosis for him. He knows that this student has to be counseled over and over again in order that he may perform, something that would not be recognizable from the grades reported in the secondary school record. Perhaps the counselor would like to de-emphasize the data in regard to this student. He can do this effectively, efficiently, and objectively in the ratings that are requested in the secondary school record form.

An Index Made from Counselor Ratings

Examination of the current secondary school record form (see Appendix) reveals three sets of ratings which are normally completed by the high school counselor in the following order:

A. Ratings on a continuum between "poor" and "truly superlative", numerically represented as 1-9, are found for ability and motivation. Since the writer deliberately sought measures as much as possible independent of scholastic aptitude, the ability ratings were excluded.

B. Ratings of character and personality were excluded, since examination of a sample of forms indicated that many counselors do not complete these ratings, preferring to substitute a locally constructed set of ratings or another form.

C. Ratings of academic promise, of character and personal promise, and of an overall recommendation, each with a five-point scale between "not recommended" and "enthusiastically recommended" were logically assigned a 1-5 numerical scale.

The four sets of ratings, one of motivation and three of promise, were summed to create a variable of theoretical range 4-24, called the Admission Index, and it may best be described as an index of counselor ratings of motivation and promise. The content of the variable was not new. Construction of the variable amounted to quantifying information which is traditionally used at the time of decision making. The study became, essentially, that of examining the properties of such a number.

Results of a Pilot Study of the Admission Index (AI)

For 583 members of the Class of 1970 with complete data (94% of the total class), the distribution was found to be skewed in a similar direction to that of high school rank. The sample was divided into approximately equal subsamples, defined as those high on the index (a score of 22 and above; N = 299) and low on the index (21 and below; N = 284). Table IV-1 shows the results of t-tests of the differences between means of traditional pre-admission variables and GPA for the first semester in college for the groups high and low on AI.

Table IV-1

Univariate Statistics for Groups High and Low,
Pilot Study of the Admission Index:
Class of 1970

Variable	Rated High N = 299		Rated Low N = 284		t
	Mean	S.D.	Mean	S.D.	
SSR (Std)	68.09	6.70	62.24	6.91	10.37 **
SATv	66.21	6.62	62.49	6.40	6.90 **
SATm	69.34	7.11	65.49	7.05	6.56 **
CBAT	66.44	6.11	61.97	6.35	8.65 **
PSI	2.69	0.36	2.35	0.35	11.56 **
GPA	2.65	0.62	2.26	0.56	7.91 **

** P < .01

Clearly, the groups defined as high and low on AI were significantly different on the traditional variables, indicating that generally counselors rated higher those who were higher. The next step was to examine AI as a potential contributor to an equation of prediction. AI was added to the four basic academically related variables, SSR, SATv, SATm, and CBAT for analysis by stepwise multiple regression with a criterion of GPA for the first semester. In order of contribution, AI was third, following SSR and CBAT but ahead of both SATv and SATm. A multiple correlation of .53 was derived for the three variables, SSR, CBAT and AI, and the following equation of prediction was determined:

$$\text{PSI} = .0245\ (\text{SSR}) + .0227\ (\text{CBAT}) + .0384\ (\text{AI}) - 1.4143$$

where both SSR and CBAT are in two-digit standard form. The overall F for the equation was significant (F = 11.23), and a Standard Error of Estimate of .5294 for the new PSI was determined. AI added significantly (F = 10.85) to the variance accounted for when the variables were the first two, SSR and CBAT.

An Admission Index for the 1950-1952 Data

It was now considered worthwhile to examine the data of the Classes 1950-1952 to ascertain whether a variable similar to that of AI in the pilot-study could be generated. The practice was for the admission office to send a rating form to the school principal and to two other raters nominated by the candidate for admission, one of whom was usually a teacher (see Appendix). The raters were asked to judge students as "superior, good, average, below average, or do not know" on nine personality characteristics such as industry and reliability. In the original collection of data, numerical ratings of 5-1 had been logically assigned to these ratings as follows:

5 = All superior ratings
4 = Majority superior
3 = Majority good
2 = Majority average
1 = Two or more ratings below average

Also within certain characteristics, for example Industry, a 1-3 scale had been devised, where, across the ratings:

3 = Above average ratings

2 = Generally average ratings

1 = Generally below average ratings

The rating for Industry was added to the sum of the three overall ratings, theoretically to derive a full-scale of 4-18, considered in the 1950-1952 data to be comparable to AI in the pilot-study of 1970 data.

Two analyses were conducted to determine the validity of adding the rating of Industry to the sum of the Overall Ratings. In Table IV-2 are found the correlations between the Sum of Overall Ratings (R), Industry (I), AI (R+I) and traditional variables, for the non-veteran data of the Classes 1950-1952 and similarly between Ratings of Promise (P), Motivation (M), AI (P+M) and traditional

Table IV-2

Validity Study of the Admission Index

Variable	Non-Veterans 1950-1952 N = 1222			Class of 1971 N = 689		
	Overall Rating (R)	Industry Rating (I)	AI (R+I)	Promise Rating (P)	Motivation Rating (M)	AI (P+M)
SSR#	.35	.40	.43	.41	.45	.48
SATv	.11	.05	.11	.26	.22	.28
SATm	.10	.06	.11	.29	.27	.32
HSAV	.40	.41	.47	.39	.43	.45
CBAT				.34	.36	.38
PSI	.32	.31	.37	.41	.43	.47

#Percentile for 1950-1952 data and Standard for 1971 data variables for the data of the Class of 1971, for which AI was originally determined. The patterns of correlation for each set of results in Table IV-2 are so similar as to support a hypothesis that R and I measure the same thing as M and P, and this is supported by significant correlations between R and I (.31) in the 1950-1952 data and P and M (.60) in the 1971 data. The lower correlation reflects the restricted three-point range of I in the data for the older classes. For each set of data, R and I, and P and M, appear to make each other redundant. On the other hand, their sum is superior to either of them insofar as potential for prediction is concerned.

Validity and Reliability of the Admission Index

Correlations between AI, traditional pre-admission variables, PSI and GPA for the first semester of college are shown in Table IV-3. Analysis of the veteran data may be considered to be a replication of the analysis of the non-veteran data for the same classes, and, similarly, analyses of the 1966-1968 and the 1971 data are replications of the analysis of AI in the pilot-study of the data of the Class of 1970.

To the extent that measures of achievement are criteria for the examination of the validity of a variable of motivation, AI consistently manifested higher and significant correlations with SSR and HSAV or CBAT, when compared with correlations with the aptitude variables SATv and SATm. The significantly lower correlations between AI and measures of aptitude, SATv and SATm, were consistent for the data of both the older and more recent classes. This finding meets the need to some extent to find motivation variables independent of ability. Correlations between AI and PSI, which is a function of achievement variables, and GPA for the first semester in college, were significant and consistent.

The usual test-retest or split-half correlations of reliability could not be conducted for AI. To the extent that reliability may be inferred from the

Table IV-3

Replications of Correlational Analysis of Traditional Variables and the Admission Index

Variable	Groups				
	Non-Vets 1950-1952	Veterans 1950-1952	Classes 1966-1968	Class of 1970	Class of 1971
	N = 1222	N = 905	N = 1616	N = 583	N = 689
SSR#	.43	.39	.47	.47	.48
SATv	.11	.08	.25	.30	.28
SATm	.11	.19	.27	.31	.32
HSAV	.47	.43	--	--	.45
CBAT	--	--	.34	.40	.38
PSI	.37	.30	.44	.51	.47
GPA	.28	.22	.30	.37	.29

# Percentile SSR for 1950-1952 data and Standard SSR for 1966-1971 data

consistency of correlation patterns found when a variable is correlated with several other variables for similar populations at different times, it is reasonable to infer from the results found in Table IV-3 not only that AI is quite reliable but also that AI for the 1950-1952 examinations is a proximate variable to AI for the recent classes.

The Admission Index as a Success Predictor

For the total samples in the study, non-veterans (N = 1222) and veterans (N = 905) of Classes 1950-1952 and Classes 1966-1968 (N = 1616), AI was analyzed in terms of the success criteria of graduation from college and award of an advanced degree. A further success criterion, that of being rated successful over the long-term was also available for Classes 1950-1952. A full description of this criterion is found in Chapter VIII. This criterion had to be modified to that of having entered a graduate school for Classes 1966-1968, graduation being too recent to the collection of data for more than a few of them to have graduated from graduate school. Plans beyond college were not known for about one-fifth of the sample, and only about one-sixth were known actually to be employed. Further, another one-fifth of the sample were in military or other services such as the Peace Corps at the time of data collection, and it is reasonable to assume that many of them would return to graduate schools.

The results of t-tests, testing the null hypotheses that there would be no difference in the means of AI for successful and less successful groups against the alternate hypotheses that the successful groups would manifest higher AI means, are found in Table IV-4. Clearly, AI discriminated significantly between groups in favor of the graduates, those awarded an advanced degree and those rated successful over the long-term. The inference would be that ratings of high school students made at the time of admission to college are sensitive to success far beyond the immediate criterion of early academic success in college, with which a positive and significant correlation is noted in Table IV-3. In the case of the criterion of rated successful, the lapse of time between the ratings and the criterion was about 20 years.

The design called for examination of the index in terms of success groups of the total samples in this chapter. The finer tests of the power of AI to discriminate between success groups in a risk population which is the focus of the study, of AI's value in the prediction of the long-term success of risks, and of its relative value when compared with traditional variables, are considered in Chapters VII-X.

Table IV-4

Results from Analyses of the Admission Index for Success Groups: Non-Veterans and Veterans, Classes 1950-1952 and Classes 1966-1968

Groups	Admission Index											
	Non-Veterans 1950-1952 N = 1222				Veterans 1950-1952 N = 1275				Classes 1966-1968 N = 1616			
	Mean	S.D.	t#	N	Mean	S.D.	t#	N	Mean	S.D.	t#	N
Graduates	12.60	1.85	4.05 **	903	11.95	1.86	5.29 **	891	19.70	2.60	4.70 **	1324
Non-Graduates	12.11	1.86		319	11.32	1.99		384	18.89	3.05		292
Advanced Degree##	13.00	1.90	6.50 **	422	12.16	1.82	3.55 **	225	20.07	2.44	6.74 **	683
No Advanced Degree (Or Unknown)	12.20	1.80		800	11.68	1.93		1050	19.18	2.82		933
Rated Successful	12.92	1.89	5.25 **	357	11.97	2.04	1.78 *	232	--	--	--	--
Not Rated Successful	12.29	1.83		865	11.71	1.89		1043	--	--		--

* P < .05; ** P < .01

One-tailed test: mean of successful group > mean of less successful group

For Classes 1966-1968 the criterion was that of entered graduate school

Summary

The purpose of this chapter was to describe the theory and the collection of data which underlay the construction of the Admission Index (AI), its validity, reliability and the extent to which it added to the variance accounted for by other variables. Further, since the focus of the project was a risk population, the opportunity was taken in this chapter to examine AI as a discriminator between successful and less successful groups in the total samples. Application of the variable belongs to the later chapters.

The construction of AI amounted to an attempt more directly to involve the secondary school counselor (or the official responsible for forwarding the record and recommendations of a candidate for admission) in the admission process by creating a variable from his ratings of academic promise and motivation found in the secondary school record used by Brown. Such ratings were summed to make the index for the recent classes. For both the non-veterans and veterans of Classes 1950-1952, a proximate index was created by quantifying and summing the ratings of the three referees who were nominated by the candidate as part of the procedure for those applying for admission to those classes. It was hypothesized that such an index would be success oriented, in that success in the fullness of time may well be as much related to the impression that is made upon an individual in the position to advance a person as it is upon a person's achievement. It was also hypothesized that AI would be a measure of motivation.

Correlation patterns between AI and other variables for the current classes and those of nearly 20 years ago not only subscribed to the consistency of AI for both sets of data but also to their equivalence. Further, on the basis that a variable reflecting motivation or success orientation would be expected to correlate substantially with variables of achievement, AI was judged to be valid, by its significantly higher correlation (range: .34-.48) with variables of high school achievement and also with the prediction of GPA for the first semester in college (range: .30-.51) than with variables of aptitude (range: .08-.32). The consistently significantly lower correlations with aptitude (SATv and SATm) supported the hypothesis that such a variable would be somewhat independent of ability.

Several variables for the total sample of Classes 1966-1968 were analyzed by stepwise multiple regression analysis to examine the order of contribution of AI and the extent to which it added to the variance accounted for by traditional variables when the criterion was GPA for the first semester in college. AI was found to rank third, after SSR and CBAT but above SATv and SATm, and to add significantly (F = 10.85) to the variance accounted for by SSR and CBAT.

In the total samples of non-veterans (N = 1222) and veterans (N = 1275) of Classes 1950-1952 (N = 1616), had such a variable been made available at the time of their admission it would have separated significantly those who would graduate from the non-graduates, those known eventually to have attained an advanced degree from those not known, and those who were rated successful 15-17 years after graduation from those not so rated. The latter criterion was not available for Classes 1966-1968, but the more recent AI significantly separated both graduates from non-graduates and those who entered graduate school from those who did not.

CHAPTER V

ENVIRONMENTAL INDEX (EI)

The description of a student is partial, indeed narrow, if it is limited to the traditional academic data of class rank and measures of achievement and aptitude. Further, the typical regression model which draws upon such data appears to have run its course with a plateau of try-out correlations between prediction and actual achievement in the area of about .50 at Brown and, from research reports, this appears to be a general finding in other institutions. The addition of further academic variables generally adds little or nothing to the variance accounted for and seems to indicate that the collection of new data of the traditional type is unjustified both statistically and economically. The trend in recent years has been toward a search for new data of a non-academic nature of which family background characteristics are a type.

The consensus of research supports the exploration of socio-economic data, typically collected by way of biographical inventories, although not all researchers have been successful. Astin (1964) found that biographical data were effective predictors in that college drop-outs could be predicted from father's education, mother's education, father's occupation, and the number of peers attending college. Lunneborg and Lunneborg (1964) found themselves in agreement with Astin (1964) that socio-economic level contributed to college success, on such items as father's education, mother's education, father's occupational type and level, student's vocational goal, high school student government activity, expectation of literary activity in college, and academic honors in high school. Lunneborg and Lunneborg assert that intellective measures contribute most to the absolute prediction of college grades, but that non-intellective measures do contribute to differential prediction and thus have a place in prediction when the goal is maximum utility to the individual.

Nichols (1966), in a study which compared National Merit Scholars and Finalists with groups representative of college students in general, showed that Merit Students typically came from families of higher socio-economic status, and chose majors in the physical sciences, engineering or humanities rather than education, business, or accounting. Lunneborg and Lunneborg (1966) found that the best composite predictors of withdrawal from college and of change in major consisted entirely of non-intellective predictors, and that biographical items were particularilly helpful in the differential prediction of success in several college fields. Harmon (1966) in a study of factors which influenced the attainment of Ph.D's found that students who were more likely to attain Ph.D's were those whose parents had at least a high school education, whose fathers had professional jobs, who were first born children of small families, and other characteristics of a biographical nature.

Abe et al (1965) in an investigation of different types of student characteristics across a sample of colleges asserted that:

> Since students differ on almost any characteristic we have examined, the differential selection and rejection of applicants is a powerful and pervasive tool for shaping the character of a student body. Colleges by relatively simple methods can modify the nature of their entering classes. The admission process is then not only a powerful process in which it is possible to raise or lower the intellectual level of a student body, but also it is a process in which the college can obtain various combinations of student values, personalities, interests, and goals. Such manipulations are of great importance, since students create a large, and perhaps the largest, portion of the institutional atmosphere. Colleges can remodel their socio-psychological climates by the selection of larger numbers of students with desired traits. In this fashion in only a period of several years, colleges if they wish can move in those directions that they have established as desirable.

Some researchers have found that biographical data are more effective predictors than more subtle personality scales. Holland and Astin (1962) followed up on an earlier finding (Holland 1961) that the higher the student's grades the less likely it would be that he was creative, called for the abandonment of efforts to construct sophisticated inventories and to concentrate instead upon securing more complete student records. Brown and Dubois (1964) suggested that psychologists may have erred in using such indirect methods of assessment. Astin (1964) recommended that whereas more consideration should be given to the use of personality variables as predictors, investigators should consider "tailor made" local tests and that more information should be obtained about a student's plans at the time he enters college. Venables (1966) found that what one does with "one's gray matter" is to a very great extent culturally determined, but Sewell and Armer (1966) argued in their study that the influences of neighborhood on educational aspiration were negligible, after the effects of sex, socio-economic status, and intelligence were controlled. However, Boyle (1966), in a rebuttal, demonstrated that their own data showed that living in a high status neighborhood gave a considerable advantage to both boys and girls.

Use of a Questionnaire

In a discussion of ways by which an institution may study itself, Trow (1965) directed his attention to the questionnaire as a means to shed light on the characteristics of a college's entering students. He noted that colleges vary in the amount of knowledge they possess about their students typically knowing the distribution of college board scores, the geographic distribution of students, what schools they came from and their academic records, but that beyond these data many colleges knew little or nothing else. Yet, vital information could be easily available for the assessment of recruiting patterns and the formulation of admission policies.

A questionnaire would reveal to a college more information about its human potential than could ever be captured from the impression of student's by admission officers or faculty. An administration which chose to use systematically collected data likely would be better informed and its policy more effective, if made on the basis of real information about its students rather than on hunches and impressions. Such data would reveal the nature of the sub-cultures which comprise a major part of a student's college environment. A college interested in learning more about itself would find useful a study of the nature and strength of the sub-cultures within the student body helpful in pointing the way to administrative action. Such data is typically biographical. Without such data it hardly occurs to anyone to ask more specific questions, questions which involve more than the decision to admit, but also the progress or survival of students, their sense of belonging or separation, the wholesomeness of their college lives, as well as academic satisfaction and student-faculty relationships. The use of such data would help as change is contemplated, for as biographical information is sensitive to the individual so also it may be a barometer to institutional change. An institution is, in the last analysis, essentially a grouping of individuals.

Admission Forms as a Source of Data

Biographical information containing a number of items which have been cited as predictors have been available to Brown and other colleges for many years in the forms completed by students making application for admission. Hills (1965) noted that at Georgia Institute of Technology Warren Willingham recognized such an admission form as a source of potentially useful biographical data. Wallingham found not only that 15 out of 30 items on the institute's application blank repeatedly improved prediction accuracy when added to traditional academic variables but also that they were about as efficient as the scores from two achievement tests at that institution.

The use of the admission form has several advantages. It requires no special administration, is available for every student, and it can be revised at will by the institution. Further, it is well known that respondents do not always give the same responses on questionnaires for research purposes as they give on questionnaires used for personal evaluation. Items in a form required of an applicant through a college's admission process would fall into the latter category, and they may be more likely to have validity for research purposes than items collected from additional biographical data forms collected at another time.

Procedure for this Project

The possibility was examined in this study of modifying Brown's Personal Information Form which is part of the credentials for admission, by combining with the present form an inventory of biographical items, some of which would be retained from the old form, supplemented by new items. The aim was to derive from it an Environmental Index (EI) with items that were a function of risk status, where the score would tell the admission officer not only something about the environment of a candidate for admission but also the extent to which he might be considered a risk by virtue of his environment. A sample of risks was needed, not defined by a cutoff on SATv. It was noted earlier that it was the practice for the admission officer to declare for each of the recent classes, prior to their first semester in college, a group intuitively deemed to be risks. This group was defined as the original risks (OR), and the remainder of each class were defined as the original non-risks (ONR). The theory was that if a sufficient number of biographical items could be found which discriminated between OR's and ONR's, they could be combined into an inventory. Whereas any person may have characteristics in common with risks on a single item, it was hypothesized that having more and more characteristics typical of a risk population would define a subject as riskier and riskier. It was conjectured that an environmental pattern would emerge, if the items were restricted to those of the parent-home-school-community, for example education of the fathers of risks versus non-risks. A scoring key would be devised.

The Index for Classes 1971 and 1972

The College-Student Questionnaire, (CSQ) which contains a large number of biographical items was given during the first week of the freshman year to matched samples of 75 OR's and ONR's of the Class of 1970 and matched samples of 143 OR's and ONR's of the Class of 1971. Both matchings were made on PSI.

The Educational Testing Service (ETS) provided the service of returning summaries of counts on the items within each question of the CSQ for groups delineated prior to scoring, and it was a clerical procedure to organize these counts into contingency tables for analysis. An internal examination of each contingency table was made to find that part which contributed most to the significant chi square sum, with a test of N that the corresponding frequencies must account for 20% or more of the total who answered the question. Not all CSQ items, found to be significant and meeting the test of N, were retained. The choice was governed by their being:

(a) Similar to items in the current personal information form for admission to Brown.

(b) Valid parent-home-school-community items.

(c) Ethically, inoffensively, and tactfully appropriate, since they would eventually be part of a form speaking for the university and subject to the scrutiny of parents of candidates for admission.

(d) Only items found to be significant in both examinations of data for the Classes 1970 and 1971.

ETS also provided the service of processing locally-added items which were based upon admission office and counseling experience. The following 24 items finally determined the full-scale inventory.

OR more likely to be on scholarship.

OR more likely to work six to ten hours per week while in college.

OR less able to meet full costs of college.

OR more likely to come from a high school where less than half of his class were college bound.

OR less likely to think that his high school did a good job in preparing him for college.

OR more likely to prefer to be remembered as an outstanding athlete or most popular rather than a brilliant student.

OR less likely to have participated in literary, debate, speech or dramatic activities.

OR more likely to have participated in school spirit activities.

OR more likely to have spent one or more hours per average weekday watching TV, during his senior year in high school.

OR's father less likely to be professional by occupation.

OR's mother less likely to be professional by occupation.

OR's parents' total income more likely to be less than $6,000 per annum.

OR more likely to have a father without a degree.

OR more likely to have a mother without a degree.

OR less likely to have a father with an advanced degree.

OR less likely to have a mother with an advanced degree.

OR's parents likely to subscribe to two or less different magazines regularily.

OR's parents more likely not to attend cultural events.

OR more likely to have no interest in modern art.

OR less likely to come from a suburb in a metropolitan area of 100,000 or more people.

OR more likely to indicate that he changed one or more courses after they were started in high school.

OR more likely to prefer taking part in heavy contact sports such as football or lacrosse.

OR more likely to indicate a hope eventually to join a fraternity.

OR more likely to indicate his expected area of greatest problem of adjustment to be academic or financial rather than social.

The items were included in a questionnaire (see Appendix) with others considered experimental or which were traditionally included in the original Personal Information Form for Application to Brown. Only the 24 significant items were counted for EI, scores of one and zero being assigned to each, making for a full scale of 0-24. The questionnaire was given to the Class of 1972 in the first week of the freshman year.

For the Class of 1971, in addition to the matched samples needed for analysis, all other students received the CSQ, and thus an EI score was derived for the total sample. Their scores and those for the Class of 1972 were combined and transformed into standard scores, the distributions of which are found in Table V-1.

Table V-1

Distributions of the Environmental Index for Classes 1971 and 1972

Raw Score	Standard Score Equivalent to Raw Scores	Class of 1971 N = 734	Class of 1972 N = 731
21-22	77-80	3	
19-20	71-74	16	5
17-18	66-68	53	36
15-16	60-63	106	75
13-14	55-58	127	130
11-12	49-52	138	155
9-10	44-47	100	159
7-8	39-41	97	94
5-6	33-36	68	55
3-4	28-31	22	21
1-2	22-25	4	1
Raw Score Mean		11.42	10.97
Raw Score S.D.		3.93	3.45
Std Score Mean		50.51	49.36
Std Score S.D.		10.49	9.35

An Index for Classes 1966-1968

For the 1966-1968 Classes, an attempt was made to derive an index as close as possible to that of EI derived for Classes 1971 and 1972 by determining information maximally available from admission folders. Twelve items were found of the 24 included in EI for the Classes 1971 and 1972, which may be considered to be in its latest stage of development. They included those of community, father's education and occupational status, whether father graduated from college, whether he took an advanced degree, his occupational status, whether mother graduated from college, her occupational status, the student's desire for dramatic, literary, and debating activities, his liking for heavy contact sports, his need for work while in college, and his scholarship need. Scores of one and zero were assigned as for the most recent EI, determining a range of 0-12 for the 1966-1968 data. It was because of the different ranges of raw scores that EI was standardized for comparable measures. The distribution of EI in standard form for Classes 1966-1968 is found in Table V-2.

Table V-2

Distribution of the Standard Environmental Index for Classes 1966-1968

Std Score	Frequency N = 1616
75-80	2
70-74	51
65-69	100
60-64	166
55-59	222
50-54	224
45-49	249
40-44	247
35-39	225
30-34	100
25-29	30
Mean	49.58
S.D.	10.24

A student with a higher EI score may be described generally as one who is socio-economically (or environmentally) more fortunate than one with lower scores.

Validity and Reliability of the Environmental Index

Validity

The problem of a criterion is substantially met if one considers an environmental or socio-economic scale to be culturally related, and if culture is considered to be associated with verbal facility. It would be reasonable to expect encouragement to read and greater opportunities for growth of verbal command to be found in homes where parents are likely to be professional or executive, suburban, and educated people. Davis (1965) reported (without qualification) that SATv and past performance correlate with socio-economic status. Table V-3 shows the correlation matrix of EI and variables basic to the study for Classes 1966-1968, 1971 and 1972.

Table V-3

Validity Study of the Environmental Index
for Classes 1966-1968, 1971, 1972

Variable	Environmental Index#		
	Classes 1966-1968 N = 1616	Class of 1971 N = 690	Class of 1972 N = 711
SSR (Std)	-.06	-.13	-.05
SATv	.14	.38	.37
SATm	.08	.11	.10
CBAT	.14	.17	.33
PSI	.10	.13	.16
GPA	.15	.22	.21
AI##	-.01	.05	.11
LOMAS###	.10	.21	.28

* P < .05
# Full scale (0-24) for Classes 1971 and 1972; reduced scale (0-12) for 1966-1968
## Admission Index as described in Chapter IV
### Index of culturally related extracurricular activities (For Classes 1966-1968, N = 1149)

The generally lower correlations for the data of Classes 1966-1968 reflect attenuation due to the more restricted range of EI for these classes, EI for these classes containing only one-half the number of items of EI for the more recent classes. The Davis (1965) statement that socio-economic status and SATv are related was supported by significant correlations between SATv and EI in all three analyses. Further, correlations between EI and SATm were found to be significantly inferior to those between EI and SATv. Two of three sets of correlations between EI and SSR, considered to be a good measure of past academic performance, were significantly negative. However, correlations between EI and CBAT, which may also be considered to be a measure of past academic performance, were significant and positive, a finding duplicated in the correlations between EI and GPA for the first semester in college. Correlations between EI and LOMAS, a full description of which is found in Chapter VI, a culturally related variable, the sum of literary, oratorical, musical, artistic, and scientific activities and accomplishments, were also found to be significant. These correlations are probably underestimates of true coefficients which would be expected if LOMAS had a wider range and more normal distribution.

On the basis of correlations between EI and verbal ability (SATv) and between EI and a cultural variable (LOMAS), support for the validity of EI was found, but with reservations, since it is acknowledged that verbal and literary items were built into EI. Two of the three sets of correlations between AI and EI suggested that school counselor recommendations and environmental status were not related.

Reliability

A sample of applicants to the Class of 1973 were asked to complete the questionnaire, from which EI was determined for the Class of 1972, as part of the admission procedures. Eighty of the sample who became members of the Class of 1973 were asked again to complete the questionnaire during the freshman orientation period. A test-retest correlation was obviously more than an examination of reliability in the classical tradition. Not only was there a substantial time lapse of about one-year for early applicants to about six-months for those applying close to the application deadline but also the very nature of the items made for possible modification of responses in the light of experiences manifested during the pupil's senior year in high school and his summer vacation. Further, such a correlation would also be expected to be an index of pre-admission and post-admission attitude. An actual correlation of .81 between the two sets of responses was found, consistent with coefficients of stability to be expected in the cognitive domain.

An Environmental Index for Classes 1950-1952

The ultimate goal was to determine the potential of such a non-academic variable as a predictor of long-term success, but it must be apparent to the reader that an identical index to that created for the recent classes was beyond the available information. The writer was limited to the data which had already been collected; also, intuitively defined risks as determined for the recent classes were not available for Classes 1950-1952. However, during the earlier phase of the project, students had been classified on a 1-10 scale, where 1-6 defined them as having desirable grades in high school or acceptable grades plus some favorable characteristic or attribute, and 7-10 defined the remainder in such terms as having influence (such as connections or athletics), indicated potential or no visible qualifications for acceptance. It was the decision of the Director of Admissions that those designated 7-10 should be considered the OR's and 1-6 the ONR's. All items considered to have some relationship with those in the questionnaire were identified and examined, and the following limited range were found significantly to discriminate between OR's and ONR's in the non-veteran sample.

OR's father was more likely to be professional or executive.

OR's father was more likely to have been a college graduate or attended college.

OR's future plans were likely to be business oriented or not requiring graduate school.

OR more likely to like humanities.

OR less likely to enjoy mathematics and the natural sciences.

OR more likely to have had two or more athletic awards in high school.

OR more likely to have had less than two scholastic awards in high school.

Clearly, the nature and number of the items made for an index which is quite different from more recent indices. The reader is warned not to take the results of a variable with the same name and to examine it for equivalence to the results of EI for the recent classes. This is not in any way considered to be a weakness. If the index had not picked important differences in the classes over time, then EI would have fallen short of the expectations for it. The two sets of items support such hopes. EI was intended to give more than a number; in addition it was expected to tell more about the nature of the student body than would be available from traditional objective measures. The development of EI for 1950-1952 was further justified, because it was an attempt to identify from admission folders information which has predictive value for long-term success. If this could be demonstrated, continued research in this area is justified. However, the reader may answer that the difference points up the weakness of such a summation, and the writer is aware of the typical differential studies in contemporary research. However, the purpose of a study of long-term graduates, for the most part, was to supply leads for research on recent graduates, and one of the purposes became that of testing the value of such a summation. EI in its latest stage of development is the suggested variable.

EI for 1950-1952 was developed on the non-veteran data and then applied to the veteran data. The distributions of both sets of scores are found in Table V-4.

Table V-4

Distributions of the Environmental Index for Non-Veterans and Veterans, Classes 1950-1952

Raw Scores	Non-Veterans N = 1222	Veterans N = 905
7	31	23
6	109	97
5	202	184
4	261	227
3	274	178
2	213	118
1	111	66
0	21	12
Mean	3.51	3.76
S.D.	1.59	1.55

Both distributions are slightly skewed, the frequency for non-veterans with the lowest score of 0 and 1 and the frequency of veterans for the highest scores of 6 and 7 being higher than expectation. Normality of the distributions was examined by way of the chi square test of goodness of fit and both were found to deviate (Non-veterans: $\chi^2 = 19.83$, d.f. = 5); (Veterans: $\chi^2 = 28.73$; d.f. = 5). Although the difference between means of EI for both sets of data was significant ($t = 3.64$; $P < .01$), the distribution of EI for the veterans was considered good replication.

Correlations between EI and pre-admission variables of scholastic aptitude and achievement, predicted and actual grade point average in the first semester in college, and with AI, are found in Table V-5. Reliability and predictivity of EI as it applied to the older classes was supported in the consistency of the

Table V-5

Correlations Between the Environmental Index and Other Variables, Classes 1950-1952

Variable	Environmental Index	
	Non-Veterans N = 1222	Veterans N = 905
SSR	.40	.30
SATv	.08	.01
SATm	.26	.27
HSAV	.42	.32
PSI	.34	.19
GPA	.21	.16
AI	.20	.10

patterns of correlations for the non-veterans from whose data the index was contrived and the veterans to use data the index was applied. Clearly, the content of EI for the sample of Classes 1966-1968 made for quite a different index, as may be seen from Table V-3, reflecting the inversion of items such as that of father's education. The risk of Classes 1950-1952 was more likely to have a father of status with a college degree and the risk of recent classes less likely.

EI as a Success Predictor

It has been noted that an important aim in making an EI for the 1950-1952 data was to examine the potential of such a summation of biographical data as a success predictor. The data for all non-veterans and for all veterans of Classes 1950-1952 and the sample of Classes 1966-1968 were examined in terms of success groups defined as:

a) Graduates and non-graduates

b) Those awarded an advanced degree and those not so awarded or unknown

c) Those rated as long-term successful and those not so rated

The results of t-tests between the means of EI for the groups are shown in Table V-6. Differences between the means of EI corresponding to graduates and non-graduates were found to be significant for all three samples. The results imply that over 20 years ago and as recently as the closest graduates to the study, the fact of graduation had a relationship with environment. Differences between the means of EI for non-veterans known to have attained an advanced degree and those not known and for members of Classes 1966-1968 known to have entered graduate school and those not known were found to be significant. Although for this criterion, the more successful veterans had a higher mean EI, the difference between groups fell short of significance. With two out of three decisive results, it is reasonable to imply that attainment of an advanced degree had a relationship with environmental status which prevailed at the time of high school.

The results when the criterion was that of being rated successful by reputation 15-17 years beyond graduation from college were similar to those for the criterion of advanced degree, significantly different means for the non-veterans and lack of significance in the difference between means for the veterans. Such a criterion was not possible for Classes 1966-1968.

Since EI for the 1950-1952 data is not comparable with EI for current students, no generalizations from the results found in Table V-6 are made beyond their implication that with a majority differences between successful and less-successful groups found to be significant, such a summation as EI of biographical data appears to have potential as a non-academic variable predictive of success. The results imply that EI could be a discriminator between success groups.

The design called for examination in this chapter of EI in terms of success groups of the total samples, regardless of risk status. The finer tests of EI's

Table V-6

Results of Analyses of the Environmental Index for Success Groups, Non-Veterans and Veterans, Classes 1950-1952 and Classes 1966-1968

Groups	Environmental Index											
	Non-Veterans 1950-1952 N = 1222				Veterans 1950-1952 N = 1275				Classes 1966-1968 N = 1616			
	Mean	S.D.	t#	N	Mean	S.D.	t#	N	Mean	S.D.	t#	N
Graduates	3.60	1.58	3.61 *	903	3.85	1.50	2.16 **	891	49.90	10.17	2.69 **	1324
Non-Graduates	3.23	1.57		319	3.65	1.52		384	48.12	10.39		292
Advanced Degree##	3.82	1.61	5.02 *	422	3.89	1.49	1.18	225	51.06	10.34	5.00 **	683
No Advanced Degree (Or Unknown)	3.34	1.55		800	3.76	1.51		1050	48.49	10.02		933
Rated Successful	3.70	1.59	2.70 *	357	3.67	1.56	1.24	232	--	--	--	--
Not Rated Successful	3.43	1.58		865	3.81	1.50		1043	--	--		--

* $P < .01$; ** $P < .05$

# One-tailed test: mean of successful group > mean of less-successful group

## For Classes 1966-1968 the criterion was that of entered graduate school.

Note that for Classes 1966-1968, EI was in standard form.

power to discriminate between success groups in a risk population, of its ability to add significantly to other variables in an equation of prediction, and of its relative value when compared with traditional variables, are considered in Chapters VII-X.

Summary

A non-academic variable, EI, was created by summing, for members of recent classes, quantified biographical data typically found in personal information forms required of candidates for admission. The essential premise that underlay the tapping of such data was the assumption that over the years admission officers may be expected to have evolved informational items not only valuable for their face value but also for their predictivity. There is beginning to emerge a consensus that such biographical data may be more effective predictors than more subtle personality scales. Such a use of the admission form would be highly economical in that it requires no special administration, is available for every student, can be revised at will by the institution, and the content may be expected to be quite reliable.

Three sources of items, the traditional personal information form for admission to Brown, related items from the College Student Questionnaire, and items from admission and guidance experience, were used in an inventory of parent-home-school-community items. Items, which in repeated analyses significantly discriminated between samples of risks and non-risks intuitively defined by the Director of Admissions after examining their folders (after admission but prior to entrance) found that such a risk was more likely: to be on scholarship, unable to pay his full way and intending to work more than six hours per week; to come from schools where less than one-half of the graduating class was college bound, and of which the pupil held his preparation for college in low regard; to have a record of academic inconsistency and to have indicated that he would expect his area of greatest problem of adjustment to be academic or financial rather than social; to prefer to be remembered as an outstanding athlete or most popular student rather than as a brilliant student and to enjoy in particular heavy contact sports; to have watched TV more than one hour per day during his senior year in high school and to indicate low interest in cultural events, modern art, literary, debate, speech or dramatic activities; to come from homes of a lower socio-economic level of parents without undergraduate degrees, who attend few cultural events and subscribe to few magazines; not to come from a suburb in a metropolitan area of 100,000 or more people; and to indicate a hope eventually to join a fraternity.

A 24 item full scale was developed from these items, but, for Classes 1966-1968, a modified scale of 12 items was used, being the maximum number that could be determined from the admission folders of these classes. These items were: those pertaining to community; parental education and status; the student's desire for dramatic, literary and debating activities; his liking for contact sports; his scholarship need and his need for work.

Validity of the full-scale was established for samples of Classes 1971 and 1972 in terms of correlation with verbal facility (.37-.38; N = 700+) supporting a finding of Davis (Davis, 1965). EI was also found positively to correlate with an index of high school involvement in culturally related activities (.21-.22) and also with GPA for the first semester (.21-.22) and CBAT (.22-.33), the average of CEEB achievement tests, but not with SSR, secondary school rank in class.

Reliability was established classically in a test-retest correlation conducted upon a sample of 80 candidates for admission to the Class of 1973, who received a personal information form which included the proposed full-scale inventory and then recompleted the inventory eight or more months later. A coefficient of stability of .81 (N = 80) was deemed not only to be comparable with reliability coefficients in the cognitive domain but also supportive of the absence of a pre-admission attitude which would cause candidates to make false statements at the time of application for admission.

A proximate EI was created for the analysis of Classes 1950-1952 from the limited data which had already been collected in the initial phase of this project. It would have been desirable to have had the time and opportunity to return to the folders of every member of these classes to collect a variable more like that for Classes 1966-1968. Instead, the data at hand was accepted and the goal was made that of testing the predictive value of such a summation of biographical items. The reader is thus warned not to read equivalence into the findings for EI in the samples of Classes 1950-1952, and Classes 1966-1968, not only because of the limited seven item range of EI for the older classes but also because of the change in the nature of the items. Such an index was postulated as one which would reflect the changing nature of student bodies. The older and newer classes of this study would be expected to be different. The findings which are appropos to the admission situation of today are those which pertain to the sample of Classes 1966-1968, the original intention for the study of Classes 1950-1952 being that of supplying leads for examination of the data of more recent classes. Throughout the report, the results for EI in the old classes are reported without qualification, their consistency, validity and significance being the foci of attention. The results for EI for Classes 1966-1968, however, are qualified in terms of a higher score being indicative of a more fortunate environment.

For the total samples of accepted non-veterans (N = 1222) and veterans (N = 1275) of Classes 1950-1952, had such a variable even as limited as the EI of the study been available to the admission officers at the time of the admission of these classes, it would have separated significantly those who would eventually graduate and not graduate, those who would attain an advanced degree and those who would not, and, in the case of the non-veterans only, those who would be rated successful 15-17 years beyond graduation and those who were not so rated. For Classes 1966-1968, EI in its later and more substantial form, clearly separated graduates from non-graduates, and those who would enter graduate schools from those who would not. For both criteria, the significantly higher mean of EI corresponded to the more successful group.

CHAPTER VI

THE ACTIVITY INDICES

Holland (1962) examined the relationship between academic performance and creativity in talented students, and his results supported an earlier finding of Torrance that most-intelligent students are not necessarily most creative, such performance being generally unrelated to scholastic achievement and scholastic aptitude. The implications of these findings is of great importance to those people concerned with college admission. Holland asserted that attempts to build better scholastic aptitude tests may even be detrimental since they may lead to greater dependence upon instruments of limited value delaying unnecessarily the development of efficient predictors of creative performance. He also suggested that school personnel may value the good-grade-getter more than the creative student. It is the latter who may be of greater value over the long-term, and instruments or measures should be sought to identify him.

A consensus appears to have been established that there is little or no relationship between college grades and non-academic adult achievement. Hoyt (1965), in a review of 46 studies, concluded that college grades fall far short as comprehensive measures of personal promise or competency. He recommended that in order to prevent a sizeable loss to society of potential contributors denied the opportunity for professional training when the exclusive criterion for professional schools is undergraduate grades, that there should be more comprehensive assessment of student characteristics than the transcript of grades usually provides. He would substitute profiles of student growth and development for the present transcript of grades "to encourage and stimulate personal development in whatever dimensions it is best expressed".

The gathering of such data would meet the recommendations of other researchers who are also concerned with the emphasis put on academic grades, that the quality of student body in both college and graduate school should be a mix and not a group highly selected for their potential to be good grade-getters. Davis (1965) noted that provision for a catalytic mix of personal characteristics should be a desired goal in admission policy and that such a notion is amenable to research. Eastman (1966) defined "mix" as that quality of student body which depends upon heterogeniety of interests, social assets, scholastic potential, ethnic background and personality types within the student group, and "fit" as that quality which depends upon the matching of characteristics with those of the student body as a whole. He recommended an admission policy of "mix" and "fit" by deliberately recruiting a majority of students who "fit" moderately but who add something to the "mix", as many as necessary pure profile fitters who can be counted upon to pay their bills and make their grades, and a smattering of students who do not "fit" at all, but have outstanding characteristics to add to the "mix". Presumably the last group would be low on academic data and high on non-academic data, such as extra-curricular achievement. It is possible that many colleges pursue such a policy, if unwritten, and for them the need for research in the non-academic domain is relevant.

A potential source of data available to an admission officer at the critical time of the selection of a student for college lies in his extra-curricular involvement in high school. Not all attempts to use such data have been successful. Lunneborg and Lunneborg (1966) found that though 76% of the subjects in their study had participated in three or more high school activities, activities of themselves were not predictive of college grades. On the other hand, Behring (1966) found that an activities preference achievement scale differentiated between high and low achievers, though he recognized that his scale may also have measured ability and aptitude.

Among several attempts that have been made in recent years to find such measures independent of both ability and aptitude, the school of thought of Holland and others (Holland, 1962; Holland and Astin, 1962; Holland and Richards, 1965; Roberts, 1965; Holland and Richards, 1966; Richards, Holland, and Lutz, 1966; Richards and Lutz, 1967) is recognized as a valued source for this study. They developed scales consisting of activities and accomplishments in such areas as leadership, music, art, drama, speech, writing, science, and social participation. Typically, each scale has a limited number of items, and scores are the number of activities or accomplishments claimed to have been pursued in high school. Usually the scores lack normality of distribution, have a mode of zero and are not standardized. Typical criteria for research have been college grades and primitive measures of non-classroom competencies deemed to be "real life" accomplishment, and derived from lists of "I can do" items such as "I can dance; I am a good cook; and I can make jewelry". The consensus of research is that such scales of extra-curricular achievement have demonstrated potential as predictors of non-classroom achievement, but, when college grades is the criterion, high school rank is superior. The scales have been found to be reasonably valid and usually reliable, and students have been found to give a frank account of their accomplishments.

Typically, researchers are critical of the concept that evaluation of a person's potential for success should be placed upon a single criterion, that of academic grades, unless the aim is only to find students who will have classroom success. They defend the use of other personal competence scales on the premise that there are many kinds of excellence calling for many decisions and that there is a need for a multi-dimentional domain of predictors which may include what their non-academic scales provide. Holland and Astin (1962) noted that better predictors than traditional measures of scholastic aptitude and achievement are much needed for high ability students. Roberts (1965), in a study of National Merit Finalists and Commended Students, found that college freshmen "A" students had fewer interests and were less active and social than were "C" students. Nichols (1965) replicated Robert's finding in a different examination of National Merit Finalists.

Procedure for this Project

The object in creating activity indices was the same as for the Admission Index and the Environmental Index, that of organizing, (adding to and quantifying) information which has traditionally been used in admission decision making at Brown. The most recent form in the hands of the writer, for example, asks the candidate for admission to list prizes and honors, athletic involvement, school activities and organizations, activities outside school and hobbies. The question of the value of such information is important. The procedure became that of making an inventory of activities and accomplishment to provide a standard frame of reference, to derive scores, and then to examine such scores for their validity, reliability and predictivity. If such scores could be shown to have real value for the admission officer then organizing such information to derive the proposed variables would be supported. Richard and Lutz (1967) defended the use of such non-academic predictors against the argument that on learning that such data were used for prediction high school officials would encourage participation in the kinds of activities that would lead to high scores with the counter-argument that anything which encourages students to participate in activities such as art, music and drama hardly seemed undesirable. On the other hand, if such scores were shown to lack predictivity, such a finding would support those students who say that they join organizations to be able to declare them on college application forms and that this pushes them toward hypocrisy.

A 40 item survey of accomplishments and activities in and out of high school was devised (see Appendix) for current classes. The three chief sources of the items were:

a) Related research reports of the American College Testing Program

b) Related research reports of the National Merit Scholarship Corporation

c) A sample of Brown admission records to find accomplishments and activities which had been reported by students in the past.

The survey consists of eight parts related to artistic, oratorical, leadership, literary, musical, scientific, social, and athletic activities and accomplishments. The opportunity to respond in terms of in-school and out-of-school-involvement was intended not only to extend the range of scores within the parts, but also to make the measures more sensitive to total involvement and not restricted to the school day. Further, deliberately to offset the possibility of having too many zero scores and to give the respondents the opportunity and comfortable feeling of being able to get responses onto paper, in each part one item considered to be a low order accomplishment or activity was included. Such an item, for example, may call for membership only of a related club. For the same reason, having at least once attained the Honor Roll was also included, an accomplishment typical of students applying to selective colleges. The collection of such data is simple. Experience has shown that the form takes about five minutes to complete as part of an orientation program in the first week of the freshman year, or it may easily be included with other forms sent to a candidate for admission as part of admission credentials, the recommended procedure.

Scores were counts within the parts. The eight scores may be used as a profile of non-classroom accomplishment. Table VI-1 shows a sample of profiles. Easily identified are the artists, orators, possible writers or dramatists, mu-

Table VI-1

Sample of Profiles of Students' Non-Academic Activities and Accomplishments

Student	Numbers of Activities and Accomplishments in High School										
	Literary	Oratorical	Musical	Artistic	Scientific	Leadership	Athletic	Social	LOMA	LAS	Total
Student A	0	0	2	0	5	6	3	1	7	10	17
Student B	1	4	0	4	3	4	0	1	12	5	17
Student C	1	3	5	4	0	2	0	1	13	3	16
Student D	2	1	1	2	3	7	4	3	9	14	23
Student E	1	2	0	6	0	2	3	4	9	9	18
Student F	1	5	2	0	0	2	4	2	8	8	16
Student G	1	1	2	8	2	2	4	1	14	7	21
Student H	5	3	0	3	1	1	6	2	12	9	21
Student I	0	4	0	0	0	4	1	2	4	7	11
Student J	0	0	0	0	0	1	0	0	0	1	1
Student K	2	3	0	5	6	6	1	1	16	8	24
Student L	3	2	5	0	0	5	0	1	10	6	16
Student M	0	0	0	0	0	2	6	0	0	8	8
Student N	2	3	2	1	9	5	5	2	17	12	29
Student O	0	1	0	0	0	1	8	0	1	9	10
Student P	1	0	0	0	3	5	3	6	4	14	18

sicians, scientists, social participants, athletes and leaders. The all-round participant and the non-participant are clearly seen, as are those who have two or three areas of involvement. The addition of such a profile to the high school academic record would meet in part Hoyt's wish (Hoyt, 1965) to have a more comprehensive assessment of student characteristics. Not only would it be valuable for a liberal arts college but also for any college looking for Eastman's "mix" (Eastman, 1966). Such a profile would be expected to be valuable to college counselors after the admission of successful candidates. As for the Environmental Index, the aim was not just to produce numbers but instruments that would be valuable for their content and the information they would provide about the student body.

On the logical assumption that culturally related activities and athletic-leadership activities are separate entities, like scales were added to result in the making of two indices, LAS and LOMAS, defined as:

LAS

LAS is a mnemonic, being the initial letters of the three parts, Leadership, Athletic, Social activities and accomplishments, logically considered to be associated and different from scholastic related activities and accomplishments.

LOMAS

LOMAS too, is a mnemonic, being the initial letters of Literary, Oratorical, Musical, Artistic, and Scientific activities and accomplishments.

Indices for Classes 1966-1968

The survey of activities and accomplishments was sent to all original members of the classes 1966-1968, immediately prior to the graduation of the class of 1968. Thus, all currently resident members of the Class of 1968 received the form while they were seniors at Brown, all graduates of the classes of 1966 and 1967 received the form as alumni, and all non-graduates of all three classes also received it as alumni. At least 70% of the original members of each class responded, specific returns being Class of 1966: 73%; Class of 1967: 70%; and Class of 1968: 70% to make a total of 1149 respondents from the three classes.

The form that was sent contained the identical 40 items that were used for Classes 1971 and 1972, and, in addition, but not used in this study, a request was made for involvement over the same 40 items during the college years. In regard to the responses for high school, respondents were asked to recall such involvement. It is important to record this aspect of data collection. Whereas LAS and LOMAS data for Classes 1971 and 1972 were collected on the first day of the freshman orientation period for each class, and whereas EXC I and EXC II for Classes 1950-1952 were determined from information supplied as part of the admission procedures for those classes, LAS and LOMAS for Classes 1966-1968 were derived from data based upon recall several years after the involvement. Some distortion of data could be expected.

The distributions for LAS and LOMAS for Classes 1966-1968 are found in Table VI-2. They are skewed similarily to those for Classes 1971 and 1972, also found in Table VI-2, but the range is extended into higher scores indicating that high school accomplishment may be more highly regarded after a number of years. The mode of zero, which has plagued related research, was eliminated.

Indices for Classes 1971 and 1972

The survey of activities and accomplishments was given to the Classes of 1971 and 1972 during the first week of the freshman year. Distributions of LAS and LOMAS for both classes are also found in Table VI-2. They are skewed, but the mode of zero was again eliminated.

Table VI-2

Distributions of the Activity Indices, LAS and LOMAS:
Classes 1966-1968 and Classes 1971, 1972

Scores	Classes 1966-1968 N = 1149		Class of 1971 N = 734		Class of 1972 N = 731	
	LAS	LOMAS	LAS	LOMAS	LAS	LOMAS
26 and above		1				
24-25	1	3				
22-23		3				
20-21	1	2		1		1
18-19	1	7		3		
16-17	4	12		2		2
14-15	11	10	2	11	2	9
12-13	37	30	13	21	17	19
10-11	91	66	45	41	29	42
8-9	187	123	99	84	100	98
6-7	262	189	183	140	173	134
4-5	250	289	197	159	206	208
2-3	204	283	126	183	132	178
0-1	100	131	69	45	72	40
Mean	5.80	5.30	5.40	5.51	5.22	5.40
S.D.	3.31	3.80	2.83	3.31	2.79	3.07

Indices for Classes 1950-1952

Among data originally collected in behalf of the veterans and non-veterans of Classes 1950-1952 were scales of the number of athletic activities, the number of scholastic activities and prizes, and for each a significance scale. The scales were as follows:

a) Athletic Activities

Rating		Number Recorded in Admission Application
0	=	None
1	=	1
2	=	2
3	=	3
4	=	4

b) Scholastic Activities and Prizes

Rating		Number Recorded in Admission Application
0	=	None
1	=	1 or 2
2	=	3 - 5
3	=	6 - 7
4	=	8 or more

c) Significance

Rating		Interpretation
1	=	None
2	=	Some
3	=	Average
4	=	High
5	=	Very High

Significance was determined by the apparent degree of involvement or accomplishment manifested in the responses; for example, having a varsity letter was considered to be more significant than intramural involvement and the breaking of school, state or national records considered to be more significant still.

In each case, for athletic activities and for scholastic awards and prizes, the index was a product of the ratings of number and significance. The lowest digit in the significance scale was made one to avoid multiplication by zero, so that a product of zero meant non-participation or accomplishment. Two variables were derived, an index of athletic-extracurricular involvement (EXC I) and an index of scholastically related extracurricular involvement (EXC II), considered respectively to be analogous to LAS and LOMAS for recent classes.

Distributions of EXC I and EXC II for both veterans and non-veterans are found in Table VI-3. The distributions were non-normal, and the mode was zero for both EXC I and EXC II for both non-veterans and veterans. Bimodality of EXC I for the latter group is a reasonable expectation since this is an athletic index which may reflect an admission policy of accepting a number of outstanding athletes.

Table VI-3

Distributions of EXC I and EXC II for Non-Veterans and Veterans, Classes 1950-1952

Scores	Non-Veterans N = 1222		Veterans N = 905	
	EXC I	EXC II	EXC I	EXC II
18-20	6	6	8	3
15-17	47	21	27	7
12-14	115	55	48	14
9-11	86	57	59	28
6-8	182	292	118	145
3-5	166	217	118	130
0-2	620	574	527	578
Mean	4.35	4.18	3.58	2.88
S.D.	4.57	3.62	4.35	3.16

Validity and Reliability of LAS, LOMAS, EXC I and EXC II

There was no valid criterion for LAS and EXC I except perhaps that of athletic involvement in college which the writer was not trying to predict. The major purpose of examining these variables was to find their relationship to success criteria. The hypothesis was that there would be a negative correlation between an athletic variable and academic achievement in college, graduation, holding an advanced degree, and being rated successful over the long-term. Similarily, there was no real criterion against which to examine the validity of LOMAS and EXC II, for which the hypothesis was that it would act more like an academic variable and inversely as LAS or EXC I.

Since, however, these variables would be used in regression and multiple discriminant analysis to derive equations for classification, then it would be imperative indirectly to examine the validity of them as potential predictors.

Correlations between pre-admission scholastic aptitude and achievement, predicted and actual GPA for the first semester in college, the non-academic variables AI and EI, EXC I and EXC II for veterans and non-veterans of Classes 1950-1952 and LAS and LOMAS for Classes 1966-1968, 1971 and 1972, are shown in Table VI-4.

Table VI-4

Validity and Reliability of the Activity Indices
EXC I, EXC II, LAS and LOMAS

Variable	Non-Veterans 1950-1952 N = 1222		Veterans 1950-1952 N = 905		Classes 1966-1968 N = 1149		Class of 1971 N = 690		Class of 1972 N = 711	
	EXC I	EXC II	EXC I	EXC II	LAS	LOMAS	LAS	LOMAS	LAS	LOMAS
SSR#	-.31	.16	-.17	.13	-.09	.16	-.14	.09	-.17	.18
SATv	-.20	.09	-.20	.03	-.28	.11	-.25	.21	-.27	.20
SATm	-.15	-.06	-.02	.11	-.17	.08	-.17	.00	-.17	.04
HSAV	-.30	.22	-.16	.19	-.30	.07				
CBAT							-.32	.12	-.34	.10
PSI	-.32	.15	-.22	.11	-.24	.12	-.30	.13	-.30	.19
GPA	-.23	.11	-.14	.08	-.19	.04	-.13	.11	-.17	.11
AI	-.09	.33	.10	.22	-.04	.13	-.04	.13	-.08	.17
EI	-.36	.16	-.29	.10	-.16	.10	-.13	.21	-.21	.28
EXC I	--	.06	--	.19						
EXC II	.06	--	.19	--						
LAS					--	.24	--	.04	--	.02
LOMAS					.24	--	.04	--	.02	--

# Percentile SSR for 1950-1952; Std SSR for 1966-1968, 1971 and 1972

From the results found in Table VI-4, it is seen that EXC I and LAS, and EXC II and LOMAS, correlated very similarly with different types of variables. Consideration of the pairs as being analogous was strongly supported. LAS and EXC I scores were found to correlate negatively with pre-college and college measures of academic achievement. This inverse relationship is not only important for an admission officer, but also it indicates potential for this variable in an equation of prediction where its interactive properties with other variables may be valuable. LOMAS and EXC II scores correlated significantly higher than LAS and EXC I with variables of academic achievement in high school and in college, but though LOMAS and EXC II acted more like traditional academic variables, the correlations generally fell short of significance. The results for LOMAS and EXC II also imply that they may have valuable interactive properties with other variables making them useful in equations of prediction.

LAS or EXC I correlated negatively with SATv and not significantly different from zero with SATm. Correlations between LOMAS or EXC II and both SATv and SATm were generally not significantly different from zero. These results met in part the wish of the study to devise variables independent of ability.

AI is by definition a variable which reflected high school counselor judgments of the motivation and promise of students. Correlations between AI and extracurricular variables support that raters must have held achievement in scholastically related activities in higher regard than they held athletic achievement, as predictors of academic achievement in college. It is an underlying theory of this study that level of academic performance is not necessarily related to non-classroom involvement, that the students with larger numbers of activities are not necessarily the ones with the higher grades.

Non-significant intercorrelations between EXC I and EXC II and between LAS and LOMAS respectively, clearly demonstrated that these were different summations of activities, that they should be treated separately, and that they may be expected to have unique properties.

It was possible, as for AI, to obtain a test-retest reliability coefficient for both LAS and LOMAS. A sample of applicants to the Class of 1973 were asked to complete the survey of accomplishments and activities as part of the admission credentials. All who actually entered Brown University were asked again to complete the survey during the freshman orientation period. LAS and LOMAS were redetermined and correlated with the scores prior to admission resulting in reliability coefficients of .80 (N = 80) and .84 (N = 80) respectively. The time lapse between the two sets was eight or more months. Such coefficients were deemed not only to be consistent with expectation in the cognitive domain but also supportive of the absence of a pre-admission attitude in applicants for admission.

Activity Variables as Success Predictors

The data for all non-veterans and veterans of Classes 1950-1952 and for the total sample of Classes 1966-1968 were examined in terms of success groups to ascertain whether the activity indices would have discriminated between them. The design called for such examinations in this chapter. The focus of the study was risks, and the finer tests of these indices to discriminate between success groups in risks are considered in Chapters VII-X.

The results of t-tests between the means of EXC I or LAS and the means of EXC II or LOMAS for graduates and non-graduates, those known to have attained an advanced degree (or entered graduate school in the case of Classes 1966-1968) and those not known, those rated successful 15-17 years beyond graduation from college and those not rated, are found respectively in Tables VI-5 and VI-6. The criterion of rated successful was not possible for Classes 1966-1968.

EXC I or LOMAS

EXC I was found to be a significant discriminator between graduates and non-graduates for both non-veterans of Classes 1950-1952. The results imply that those who pursued more athletics in high school were more likely to look

Table VI-5

Results of Analyses of an Index of Athletically Related Activities for Success Groups, Non-Veterans and Veterans, Classes 1950-1952 and Classes 1966-1968

Groups	Non-Veterans 1950-1952 N = 1222				Veterans 1950-1952 N = 1275				Total Sample 1966-1968 N = 1616			
	Mean	S.D.	t#	N	Mean	S.D.	t#	N	Mean	S.D.	t#	N
Graduates	3.84	4.29	6.22 **	903	3.33	4.25	2.44 *	891	5.80	3.21	0.10	1026
Non-Graduates	5.80	5.02		319	4.00	4.61		384	5.85	4.01		123
Advanced Degree##	3.25	3.90	6.60 **	422	2.73	3.58	3.51 **	225	5.49	3.16	3.04 **	540
No Known Advanced Degree	4.93	4.79		800	3.70	4.50		1050	6.08	3.41		609
Rated Successful	3.92	4.42	2.16 *	357	4.28	4.85	2.67	232	--	--	--	--
Not Rated Successful	4.53	4.62		865	3.36	4.24		1043	--	--		--

* P < .05; ** P < .01

# One-tailed test: mean of successful group < mean of less successful group

## For Classes 1966-1968, the criterion was that of entered graduate school

Table VI-6

Results of Analyses of an Index of Culturally Related Activities for Success Groups, Non-Veterans and Veterans, Classes 1950-1952 and Classes 1966-1968

Groups	Non-Veterans 1950-1952 N = 1222				Veterans 1950-1952 N = 1275				Total Sample 1966-1968 N = 1616			
	Mean	S.D.	t#	N	Mean	S.D.	t#	N	Mean	S.D.	t#	N
Graduates	4.05	3.53	2.04	903	2.81	3.12	0.41	891	5.23	3.66	1.09	1026
Non-Graduates	4.55	3.84		319	2.73	3.26		384	5.83	4.75		123
Advanced Degree##	4.55	3.82	2.51 *	422	3.25	3.53	2.21 *	225	5.38	3.72	0.71	540
No Known Advanced Degree	3.99	3.50		800	2.69	3.07		1050	5.22	3.87		609
Rated Successful	4.64	3.93	2.72 **	357	3.31	3.25	2.73 **	232	--	--	--	--
Not Rated Successful	3.99	3.47		865	2.67	3.13		1043	--	--		--

* P < .05; ** P < .01

# One-tailed test: mean of successful group > less successful group

## For Classes 1966-1968, the criterion was that of entered graduate school like non-graduates in college. The results for LAS, Classes 1966-1968, were not significant.

When the criterion was that of having attained an advanced degree (or entered graduate school in the case of Classes 1966-1968), the results were decisive with significantly lower means of EXC I or LAS corresponding to the more successful group.

The results for a criterion of rated successful 15-17 years beyond graduation from college, available only for Classes 1950-1952, resulted for the non-veterans in acceptance of the alternate hypothesis that the more successful group would have evidence of less athletic involvement in high school. Although for the veterans a significant difference in means of EXC I for the groups was found, the trend was inverse, the more successful group having evidence of more involvement in high school, so the alternate hypothesis was rejected. One can only speculate as to the reason, which could have been that in recalling the veterans, the peer raters who made the success judgments recalled best those whom they remembered best, and the outstanding athlete would have a favorable edge.

The consensus of results would seem to indicate that an index of athletic participation in high school was a discriminator between success groups, as defined, and that generally greater involvement was associated with the eventually less successful groups.

EXC II or LOMAS

The alternate hypotheses that more successful groups would have significantly higher means of a culturally related activities variable were accepted for both the non-veterans and veterans of Classes 1950-1952, when the success criteria were those of attainment of an advanced degree and being rated successful 15-17 years beyond graduation from college, but rejected when the criterion was that of graduation from college.

The indecisive nature of the results for Classes 1966-1968 may have been related to the nature of the data, which, for these classes, were collected by asking the students to recall their activities several years afterward. A more complete examination will need to await the graduation of Classes 1971 and 1972, for whom the variables were determined immediately after high school.

However, for both the non-veterans and the members of the recent classes, considered in this project to be the groups most alike, a pattern emerged in that the means respectively of EXC II and LOMAS for graduates were lower than for non-graduates and higher for those who attained an advanced degree or entered graduate school in the case of Classes 1966-1968. This was also true for the more successful group of non-veterans when the criterion was that of being rated successful 15-17 years beyond college graduation, but this criterion was not possible for the recent classes. The possibility that such a variable as one measuring culturally related activities may be discriminating between success groups over the long-term is suggested.

In summary, it would seem that extracurricular variables, being measures of non-classroom activities, appear to have potential as discriminators between success groups, though the results are not consistent. However, the correlation patterns of these and other variables indicated interesting properties of interaction that may be useful in multiple regression and multiple discriminant analysis to evolve equations for prediction of success.

Since it has been shown that LAS and LOMAS have properties similar to EXC I and EXC II respectively, particularly insofar as correlation is concerned, and that LAS and LOMAS are reliable, the study of these variables was continued, with emphasis upon discrimination in samples of risks. The results of these analyses and of their value when compared with traditional variables are considered in Chapters VII-X.

Summary

Two variables of essentially non-classroom involvement derived from responses on a survey of activities and accomplishments, LAS, a measure of leadership, athletic and social participation, and LOMAS, a measure of literary, oratorical, musical, artistic and scientific participation were proposed for this report. Two sources of items were used, those which arose from a sampling of admission forms of past students over a period of years and the many reports of the school of thought of Holland and others. The writer wished to remove the mode of zero and lack of normality which has plagued the research of this school. The essential premise underlying the use of such a survey as part of the admission materials was that it made for a comparable frame of reference in this domain, replacing the procedure where candidates freely state such involvement in a limited area of a larger form of requested personal information. The proposed form would also make provision for unique or other accomplishments.

The data of Classes 1966-1968 were collected by sending the survey to all original members of these classes, the majority of whom had either graduated or were seniors at Brown at the time, and asking them to recall their involvement. The data for more recent classes was collected during the orientation program of freshman week, and the suggestion is to use such a form as part of the admission procedures in the future. Distributions, though improved over those found in related research,were still skewed, but the modes were not zero.

For a comparable study of the non-veterans and veterans of Classes 1950-1952 a proximate variable to LAS, EXC I, and a proximate variable to LOMAS, EXC II, were derived from information available in admission folders, being a product of the number of activities reported and the subjectively determined level of their significance on a 0-4 scale. The distributions of EXC I and EXC II were non-normal, like those found in related research with modes of zero.

Validity of the variables for both the older and more recent data was established insofar as such is possible. The significantly negative correlations of EXC I with traditional academic pre-admission variables were duplicated for LAS, and the more positive nature of correlations for EXC II were duplicated for LOMAS. The inverse relationship of the two types of variables was deemed not only to be important for the purposes of prediction but also supported strongly that the two types of involvement should be separate considerations. Adding them together, for example, and considering them as a single group of activities, would cancel out their unique properties.

Reliability was affirmed not only by the consistency of the patterns of correlations of LAS (or EXC I) and LOMAS (or EXC II) and other variables, but also in test-retest correlations respectively of .80 (N = 80) and .84 (N = 80). The latter were derived by asking a sample of candidates for admission to the Class of 1973 to complete the survey as part of admission procedures and then to repeat the procedure during the orientation program of freshman week some eight or more months later. Such coefficients were deemed not only to be comparable with those acceptable in the cognitive domain but also supportive of the absence of a pre-admission attitude which would cause candidates to make false statements at the time of application for admission to college.

In the total samples of non-veterans (N = 1222) and veterans (N = 1275) of Classes 1950-1952, EXC I significantly discriminated between those who eventually graduated and those who did not, between those known to have attained an advanced degree and those not known, and between those who were rated as successful 15-17 years beyond college and those who were not so rated. Those who attained graduation and advanced degrees would appear to have had significantly lower athletic involvement in high school. The results for ratings of long-term success were the opposite for non-veterans and veterans, lesser involvement typifying the successful non-veteran but greater involvement typifying the successful veteran. The latter result may have reflected a shortcoming in the collection of data, the possibility of the peers recalling most easily fellow classmen who were prominent in college for their athletic and related accomplishments. The results for Classes 1966-1968 were not decisive, significant differences being due in part to the very low number of non-graduates. The results for Classes 1966-1968 may also have been a function of data collection, since these classes were asked to recall their high school activities several years later.

For the data of Classes 1950-1952 for both veterans and non-veterans, the index of scholastically related activities significantly separated non-veteran graduates from non-graduates, those known to have attained an advanced degree from those not known and those rated successful over the long-term from those not so rated. Except for the criterion of graduation, the more successful group would be associated with significantly greater involvement in such culturally or scholastically related activities. The results for 1966-1968 (LOMAS) were indecisive.

CHAPTER VII

PREDICTION OF GRADUATION AS A CRITERION OF SUCCESS

The problem of criterion in studies of prediction continues to plague the researcher. Typically reported research makes use of academic success in college at the end of one or two semesters, but even that may disappear with the advent of dichotomous grading. Such a criterion is usually readily available and most adaptable to the typical model, that of regression analysis. It is a premise of this study that longer-term criteria should be found, since there are no established criteria. This chapter is concerned with the prediction of graduation and the two succeeding chapters with success beyond graduation.

However, when longer-term criteria such as graduation are considered, problems arise. The application of the results would be upon classes several years removed from those in the prediction study. Equations for prediction could be obsolete at the moment they are created in those institutions which are passing through a process from year to year of increasing selectivity in the traditional data. It is reasonable to assume that such a phenomenon cannot go on forever. From Table VII-1 it is seen that in recent years there has been a trend toward a plateau of means in such basic data as SSR, SATv and SATm at Brown. The non-veteran sample of 1950-1952 and the sample Classes of 1966-1968 are included in Table VII-1 for purposes of reference. Arrival on such a plateau would reduce the dangers inherent in applying academic prediction equations.

The basic population was that of verbal risks. Univariate statistics for the graduates and non-graduates in the three samples may be seen in Table VII-2. A one-tailed t-test was appropriate to test the alternate hypotheses that the graduates would have greater or lesser means as the data applied. A summary of hypotheses and their acceptance of rejection is found in Table VII-3, an example for which illustrates. The alternate hypothesis that in a risk sample, graduates

Table VII-1

Descriptive Statistics of Basic Academic Data:
Classes 1950 through 1972

Variable	Class													
	Non-Veterans# 1950-1952 N = 1222		Class of 1960 N = 582		Classes# 1966-1968 N = 1616		Class of 1969 N = 680		Class of 1970 N = 607		Class of 1971 N = 711		Class of 1972 N = 697	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
SSR##	66.14	25.63	73.19	22.88	86.15	15.63	88.82	14.11	88.80	13.67	89.91	11.13	88.38	14.01
SATv	50.62	8.55	54.71	7.46	61.38	7.40	62.86	6.76	63.56	6.89	63.61	7.42	64.26	7.53
SATm	55.11	8.43	58.62	8.86	65.82	7.52	67.71	7.11	67.52	7.15	68.02	7.57	68.08	7.18

Total sample of the report
Percentile SSR

Table VII-2

Univariate Statistics for Graduates and Non-Graduates in the Three Verbal Risk Samples

Variable		Non-Veterans 1950-1952			Veterans 1950-1952			Classes 1966-1968		
		Grads N = 402	Non-Grads N = 170	t#	Grads N = 286	Non-Grads N = 164	t#	Grads N = 646	Non-Grads N = 166	t#
SSR##	Mean	64.97	52.26	5.35 **	57.88	45.20	4.99 **	61.96	60.32	2.50 **
	S.D.	25.19	26.28		26.80	25.41		7.40	7.57	
SATv	Mean	43.71	42.57	2.76 **	41.14	40.18	2.06 *	55.41	55.30	0.27
	S.D.	4.06	4.69		4.53	4.87		4.56	4.80	
SATm	Mean	54.18	52.71	1.90 *	49.43	47.49	2.55 **	63.01	63.43	0.65
	S.D.	8.16	8.61		7.83	7.75		7.34	7.45	
HSAV^a	Mean	2.69	2.41	4.62 **	2.56	2.23	5.56 **	57.57	56.75	1.55
	S.D.	0.67	0.66		0.60	0.61		5.78	6.16	
AI	Mean	12.36	12.10	1.64 *	11.90	11.32	3.21 **	19.02	18.37	2.41 **
	S.D.	1.67	1.76		1.82	1.86		2.62	3.21	
EI	Mean	3.45	3.15	2.13 *	3.74	3.66	0.53	48.63	47.09	1.73 *
	S.D.	1.55	1.53		1.55	1.52		10.10	10.23	
EXC I^b	Mean	4.89	5.75	1.93 *	4.34	4.46	0.27	6.43	6.59	0.30
	S.D.	4.74	4.94		4.77	4.48		3.30	4.26	
EXC II^c	Mean	3.65	3.99	1.09	2.74	2.60	0.48	4.81	6.07	1.95 *
	S.D.	3.29	3.47		3.20	2.80		3.53	5.18	
PSI	Mean	2.08	1.85	5.99 **	1.89	1.69	4.90 **	2.14	2.05	3.02 **
	S.D.	0.42	0.42		0.41	0.42		0.33	0.35	
GPA	Mean	2.06	1.48	9.86 **	2.02	1.67	5.56 **	2.22	1.64	11.05 **
	S.D.	0.60	0.66		0.67	0.61		0.54	0.62	

For 1966-1968 data, a = CBAT, b = LAS, c = LOMAS and for b, c, Graduates = 509, Non-Graduates = 68

One-tailed test: For all variables except EXC I (LAS), mean of graduates > mean of non-graduates

%ile SSR for Classes 1950-1952; Std SSR for Classes 1966-1968

$* P < .05$; $** P < .01$

from college would have a significantly higher mean rank in class (SSR) in the high school was supported for all three samples.

Although the results were consistent for three of the pre-admission variables, rank in class (SSR), Admission Index (AI) and the prediction of GPA for the first semester in college (PSI), and also for actual GPA, considered in terms of the two types, academic and non-academic data, there was a lack of consistency. Academic variables would appear to have been more discriminating for the older classes than for Classes 1966-1968. In other words, in the more selective situation of current admissions, the results suggested that one of the real values of non-academic data might be their property to discriminate where academic variables are limited.

Table VII-3

Summary of Specific Hypotheses

Variable	Hypothesis	1950-1952 Non-Veterans	1950-1952 Veterans	1966-1968
SSR	Graduates-Higher Mean	Supported	Supported	Supported
SATv	Graduates-Higher Mean	Supported	Supported	Unsupported
SATm	Graduates-Higher Mean	Supported	Supported	Unsupported
HSAV	Graduates-Higher Mean	Supported	Supported	
CBAT	Graduates-Higher Mean			Unsupported
AI	Graduates-Higher Mean	Supported	Supported	Supported
EI	Graduates-Higher Mean	Supported	Unsupported	Supported
EXC I	Graduates- Lower Mean	Supported	Unsupported	Unsupported
EXC II	Graduates-Higher Mean	Unsupported	Unsupported	Unsupported
PSI	Graduates-Higher Mean	Supported	Supported	Supported
GPA	Graduates-Higher Mean	Supported	Supported	Supported

The results for the 1966-1968 data called for a more careful analysis of trend within both the academic and non-academic variables. The sample was a two-thirds random sample of verbal risk respondents stratified by class and graduation. Three levels of graduation, those with a cumulative average of 2.75 or better, 2.25 through 2.74, and below 2.25, and the non-graduates were defined as four groups for the purpose of one-way analyses of variance of the two sets of data. Means, standard deviations, and F-statistics for the univariate analyses are reported in Table VII-4. Overall significance was found for three of the four academic variables, SSR, SATv and CBAT together with descending means corresponding to the levels of the graduates. The same but non-significant trend

Table VII-4

Univariate Analyses of Variables for Verbal Risks, Classes 1966-1968

Variable	Graduation Level								F
	Above 2.74 N = 82		2.25 - 2.74 N = 148		Below 2.25 N = 109		Non-Graduate N = 45		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	
SSR#	64.57	7.90	61.89	6.82	59.10	7.46	60.02	6.19	9.75 **
SATv	57.10	3.27	55.41	4.59	54.12	5.20	56.22	4.15	7.26 **
SATm	64.04	7.37	63.08	7.14	62.39	6.99	63.58	6.99	0.88
CBAT	59.30	5.71	57.64	5.26	55.86	5.77	56.49	6.01	6.33 **
AI	19.55	2.24	19.21	2.49	18.62	2.91	18.31	3.15	3.19 *
EI	49.73	10.40	49.41	10.36	47.40	10.17	46.15	10.24	1.94
LAS	5.45	3.42	6.59	3.21	7.25	3.16	6.69	4.54	4.31 *
LOMAS	5.10	3.20	5.26	3.92	4.72	3.50	6.02	4.96	1.30

* P < .05; ** P < .01; # Standard SSR

was also found for SATm. However, the trend did not continue into the non-graduates for any traditional academic variable. In all cases the mean of an academic variable looked more like the middle of the graduates. The results confirmed what deans have always known, that students do not always dropout for academic reasons, and it is clear from this analysis that to identify dropouts on the basis of academic pre-admission data could be quite fruitless. This finding for verbal risks confirmed an earlier finding by Griffin (Griffin, 1965).

A different picture emerged for the non-academic data. Overall significance was found for the measure of counselor ratings (AI) with a descending order of means continuing into the non-graduates, a phenomenon not only absent in the academic variables but also lending considerable support to the validity of counselor ratings of motivation and promise. Generally, AI is the most academic like of the non-academic variables, but the property found in this trend of means makes it valuably different. Although the results for the Environmental Index (EI) lacked overall significance, the descending order of means through the non-graduates was also found for this second non-academic variable. The finding indicated not only that EI, like AI, may be a predictor of non-graduation but also that the degree of such academic achievement was a function of socio-economic background. The F-statistic was also significant for a third non-academic variable, LAS, the measure of "doing" activities in high school, but the trend for graduates was inverse in that those with the highest academic average had the lowest mean for this variable. An ascending order of means was found for the three descending levels of graduates, but the trend did not continue into a higher mean for the non-graduates which looked more like the middle of the graduates. The results for LOMAS, a measure of "joining" activities, were not so consistent and lacked significance, but the mean of the non-graduates was appreciably larger than that for any level of the graduates. Not only may

LOMAS also be a predictor of non-graduation but also the results suggest that non-graduates may be most likely to "stack the deck" with the type of activities measured by LOMAS. The overall results found in Table VII-4 would support a conclusion that an equation consisting of non-academic variables, such as proposed in this study, would be expected to separate graduates from non-graduates more effectively than one containing the academic variables.

It is seen from Table VII-2 that evidence of non-academic variables as discriminators between graduates and non-graduates was not so clearly indicated by the results for the veterans. Only AI was found significantly to discriminate between groups. This could have been a function of data collection. It is reasonable to assume that veterans may have had difficulty recalling some of the information pertinent to the non-academic variables when applying for admission to Brown several years after leaving high school. Information such as activities may not have been important for many, and, since many may never have thought of going to college, no records may have been kept for referral.

In summary, from these results, an equation based upon academic variables would be expected to effect more valid predictions of graduation than one based upon academic variables for the veterans of Classes 1950-1952, an equation of either type of variables for the non-veterans of Classes 1950-1952, and an equation of non-academic variables for the sample of recent classes.

Discriminant Analysis of the Three Samples

The non-graduate is a critically important person when the criterion is graduation, the loss of whose graduation average automatically removes him when the model is that of regression analysis. Fortunately, there was available the multiple discriminant analysis model which may be used to discriminate between groups, such as graduates and non-graduates, by maximizing the power of the variables which are introduced to separate the groups. For the two group case, the output is a single equation from which individual discriminant scores may be calculated.

The basic samples were again the verbal risks. A graduate for Classes 1950-1952 was simply anyone who graduated regardless of time taken or courses pursued. The definition of graduates was more rigorous for recent classes, being those who successfully graduated within four years, and the non-graduates were those no longer in residence during the academic year 1967-1968.

The method in all cases was to derive a discriminant function from the data of a two-thirds random sample stratified on class and graduation, and then to apply the function to the remaining one-third of the total sample. Individual discriminant scores were calculated from the discriminant function. These would be used for classification. Graduate and non-graduate centroids were calculated from the equations using the means of variables pertaining to the groups. The closeness of a discriminant score to one or the other of the centroids classified whether a candidate for admission was predicted to look more like a graduate or a non-graduate.

Several examinations were possible. The number of hits, that is agreement of predicted and actual graduates, was clearly the most important consideration. A second examination was that of comparing the percentages of hits when one function consisted of all academic variables and another of non-academic variables. A third examination lay in determining the relative contribution of variables, to identify those contributing importantly to inter-group variation.

A Function of Academic Variables

Of the four academic variables found in Table VII-2 and considered to be traditional pre-admission data for the non-veterans and veterans of the Classes 1950-1952, three variables, SSR, SATv and SATm, were introduced. HSAV was eliminated since it correlated so highly with SSR (non-veterans: $r = .79$; $N = 572$

verbal risks); (veterans: $r = .70$; $N = 450$ verbal risks). SSR, SATv, SATm and CBAT were introduced for the 1966-1968 sample of verbal risks. Univariate statistics for two-thirds random sample of the graduates and non-graduates for each category are found in Table VII-5. In Table VII-6 are found the centroids of groups in discriminant space for all samples. The F-test, the test of the discriminating power of the battery, known as the test of H_2, (Cooley and Lohnes, 1962) in rejecting the null hypothesis that there is no difference between the group centroids, supported that the centroids in space were significantly separated in all three analyses. However, it is also clear from Table VII-6 that there was appreciable overlap, because the differences between centroids were less than the corresponding standard deviations. In Table VII-7 are found the discriminant function weights used for classification, for all samples.

Analogous to the application of an equation from regression analysis, the discriminant weights are the coefficients of the variables in the equation from which the predictions are derived, in this case the discriminant scores. Examination of Table VII-7 reveals that the effects of the variables differed in the equations. Whereas the aptitude variables were additive in the equations for both non-veterans and veterans, they were subtractive for the 1966-1968 verbal risks. The implication of this for recent classes is that an underachieving verbal risk would receive a lower discriminant score. It is also clear from Table VII-6 that the lower the discriminant score the more the subject looked like a non-graduate. Thus, a verbal risk with higher SATv and SATm scores but lower SSR and CBAT scores, traditionally considered to be an underachiever, would be more likely predicted to look like a non-graduate than one with lower aptitude scores and higher achievement scores. The latter, traditionally considered to be an overachiever, would be more likely to look like a graduate. An example illustrates. A candidate for admission with Standard SSR and CBAT scores of 60

Table VII-5

Univariate Statistics for the Groups:
Academic Variables

Variable	Non-Veterans 1950-1952				Veterans 1950-1952				Classes 1966-1968			
	Graduates N = 267		Non-Graduates N = 113		Graduates N = 190		Non-Graduates N = 109		Graduates N = 430		Non-Graduates N = 110	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
SSR#	64.30	25.60	49.29	25.42	60.65	25.57	45.72	24.62	61.67	7.59	59.98	6.72
SATv	43.72	4.05	43.07	4.60	41.12	4.62	40.28	4.81	55.39	4.66	55.27	4.73
SATm	54.30	8.16	52.27	8.92	49.69	7.64	46.87	7.64	62.70	7.35	62.53	7.42
CBAT									57.47	5.78	56.05	6.26

Standard SSR for 1966-1968

Table VII-6

Centroids of Groups in Reduced Space

Samples	Graduates		Non-Graduates		F
	Mean	S.D.	Mean	S.D.	
Non-Veterans, 1950-1952	88.8406	15.2500	79.3588	15.4935	10.08 **
N	267		113		
Veterans, 1950-1952	82.2458	12.7713	73.9009	12.6131	9.88 **
N	190		109		
Classes, 1966-1968	33.9482	4.9301	32.2360	4.6912	2.67 *
N	430		110		

* P < .05; ** P < .01

Table VII-7

The Academic Discriminant Function Coefficients

Variable	Non-Veterans 1950-1952	Veterans 1950-1952	Classes 1966-1968
SSR	.5465	.4146	.3930
SATv	.7390	.7266	-.2545
SATm	.3940	.5478	-.3599
CBAT			.8070

and aptitude scores of 50 would have 41.28 for a discriminant score, placing him above the graduate centroid. On the other hand one with achievement scores of 50 and aptitude scores of 60 would have 23.14 for a discriminant score, well below the non-graduate centroid. Clearly, the former candidate would be more like a graduate and the latter more like a non-graduate. That such an equation would be discriminating with respect to the characteristics of underachievement and overachievement in a sample of verbal risks, justified an examination of the larger samples of the two types of achievers in the total sample of Classes 1966-1968 and repetition of the analyses for confirmation of findings for the Class of 1969. The reader is referred to Chapter X for the results of these analyses.

From Table VII-7, it would seem from the larger SATm coefficient, for a variable which is usually larger than the SATv in a male population in the first place, that too high an SATm was detrimental for the verbal risk. The inference could be that high SATm scores do not necessarily offset low SATv scores for verbal risks. This finding may be important for admission officers when selecting, for example, for the scientific programs. The reader is also referred to Chapter X for the results of analyses of samples with imbalanced scholastic aptitude scores in the total sample.

A Function of Non-Academic Variables

It is appropriate now to turn to the consideration of the power of a non-academic discriminant function to separate graduates from non-graduates. For both analyses of the non-veterans and veterans of the Classes of 1950-1952, the variables were AI, EXC I, EXC II and EI considered to be somewhat analogous to AI, LAS, LOMAS and EI used in the analysis for Classes 1966-1968.

In Table VII-8 are found the centroids of groups in discriminant space. Lack of significance in the difference between the centroids eliminated further analysis of the data for the veterans. It was noted in Table VII-3 that only AI of the non-academic variables discriminated significantly between the groups in the data of the total sample. That the failure was not due to a poorly se-

Table VII-8

Centroids of Groups in Discriminant Space

Samples	Graduates		Non-Graduates		F
	Mean	S.D.	Mean	S.D.	
Non-Veterans, 1950-1952	-9.5740	1.5295	-9.0113	1.5832	2.61 *
N	267		113		
Veterans, 1950-1952	-12.4680	1.8099	-11.9784	1.7926	1.26
N	190		109		
Classes 1966-1968	-23.2544	3.0841	-21.5906	3.5131	2.77 *
N	339		45		

* $P < .05$

lected sample is seen in the comparison of means and sigmas of the variables for the total and partial samples found respectively in Tables VII-2 and VII-9.

Throughout the study, the non-veterans of Classes 1950-1952 are considered to be analogous to Classes 1966-1968. The veterans have been described in Chapter II and were clearly different. The study of them amounted to a parallel study. It is clear for the veteran sample that a battery of academic variables would have been superior to the battery of non-academic variables proposed in this study, as a predictor of graduation. The remaining analyses are concerned with the non-veterans and recent graduates only. In Table VII-10 are found the discriminant function weights for the two samples.

Since effects of variables are in part a function of their signs, the consistency of the coefficients of the non-academic variables in the discriminant functions found in Table VII-10 support the validity of the variables in that

Table VII-9

Univariate Statistics for the Groups: Non-Academic Variables

Variable	Non-Veterans 1950-1952				Veterans 1950-1952				Classes 1966-1968			
	Graduates N = 267		Non-Graduates N = 113		Graduates N = 190		Non-Graduates N = 109		Graduates N = 339		Non-Graduates N = 45	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
AI	12.42	1.74	11.99	1.82	11.90	1.76	11.44	1.76	19.10	2.60	18.31	3.18
EI	3.39	1.49	3.02	1.38	3.71	1.52	3.57	1.49	48.84	10.37	46.16	10.36
EXC I#	5.21	4.81	5.46	4.84	4.35	4.81	4.39	4.76	6.53	3.32	6.69	4.60
EXC II##	3.82	3.37	3.95	3.31	2.68	3.16	2.50	2.68	5.05	3.63	6.02	5.02

LAS for Classes 1966-1968
LOMAS for Classes 1966-1968

they acted similarly when analyzed in terms of a common criterion, in this case that of graduation.

Table VII-10

The Non-Academic Discriminant Function Coefficients

Variable	Non-Veterans 1950-1952	Classes 1966-1968
AI	-.6036	-.8062
EI	-.7702	-.1958
EXC I#	-.0453	-.1532
EXC II##	.2013	.5369

# LAS, ## LOMAS for Classes 1966-1968

The subtractive nature of the coefficients of AI, EXC I and EI need to be examined in terms of the centroids found in Table VII-8. Since a lower discriminant score classified an admission candidate as being more like a graduate, then AI, EXC I and EI were positively related to graduation. Involvement in scholastically related activities (EXC II or LOMAS) was diametrically opposite in effect. In other words, the more the candidate of lower verbal ability "stacked the deck" with such "joining" activities the more he looked like a non-graduate both a generation ago and recently.

Contribution of Variables to the Functions

The use of two separate predictions based upon academic and non-academic data has been proposed. Lost is the interaction which would have been manifested in a single function with all variables. On the other hand use of separate functions allows the two types of variables to operate independently to their maximum extent.

The original method for calculating the contribution of the variables within each function was from scaled vectors (Cooley and Lohnes, 1962). In a recent letter to Celeste Griffin (see Acknowledgements), Cooley stated:

> We now feel that the correlations between the original variables and the discriminant functions are the most appropriate vectors for purposes of interpretation. The so-called scaled vectors can be standardized or normalized as long as the proportionality is maintained, but they are still subject to sampling fluctuations in a way that the correlations are not.

Correlation matrices were derived from the data of the original two-third stratified random samples of verbal risks from whom the academic and non-academic functions were derived. Discriminant scores were introduced as variables into the correlational analyses. In the analyses of the non-veterans of Classes 1950-1952 and the respondents for Classes 1966-1968, it was possible to introduce both the academic and non-academic discriminant scores. Since a lower and negatively signed non-academic discriminant score was predictive of a graduate, negative correlations would be indicative of positive relationship. So, to obviate possible confusion, negative discriminant scores were introduced in absolute form to effect positive correlations and results less vulnerable to misinterpretation. Correlations between discriminant scores, academic and non-academic variables and PSI, the prediction of GPA derived from regression analysis (variables SSR and CBAT), are found in Table VII-11.

Academic Discriminant

To the extent that discriminant scores are maximum separators, multiple discriminant analysis having maximized the power of the individual variables to separate groups, then correlations between individual scores and the discriminant scores are measures of the extent to which the individual variables are separators. For both the non-veterans and veterans, SSR was the leading separator followed by SATm. CBAT and SSR, about equally, were the leading separators for the

Table VII-11

Correlations Between Academic and Non-Academic Discriminant Scores and Pre-Admission Variables

Variable	Non-Veterans 1950-1952		Veterans	Classes 1966-1968	
	Academic Discriminant Scores N = 380	Non-Academic Discriminant Scores N = 380	Academic Discriminant Scores N = 299	Academic Discriminant Scores N = 540	Non-Academic Discriminant Scores N = 384#
SSR	.95 *	.45 *	.91 *	.65	.13 *
SATv	.25 *	.02	.29 *	.08	.02
SATm	.40 *	.33 *	.58 *	.07	.07
CBAT				.69 *	.13 *
AI	.38 *	.68 *	.31 *	.33 *	.56 *
EI	.39 *	.71 *	.28 *	.01	.49 *
EXC I[a]	-.28 *	-.14 *	-.19 *	-.14	-.09
EXC II[b]	.06	-.10	.04	.02	-.49 *
PSI	.94 *	.46 *	.91 *	.84 *	.19 *
Non-Academic Discriminant	.48 *				
Academic Discriminant		.48 *			.16 *
Mean	85.99	9.41 (-)	79.20	33.60	23.06 (-)
S.D.	15.88	1.56	13.31	4.93	3.18

Respondent Sample; For 1966-1968 data, a = LAS; b = LOMAS
* P < .05

sample of Classes 1966-1968. Since the leading variables in all samples were measures of past achievement, the adage that past academic success breeds future academic success would appear to have applied to the samples of verbal risks.

The finding for CBAT (College Board Achievement test average) is interesting for its revealed potential as a variable not only for its quality as a separator but also for its apparent independence from SSR, the rank in class. The low contribution of SATv was not surprising in a sample defined by a cutoff on SATv but clearly SATm was a more effective separator in both sets of 1950-1952 data than for the recent sample, reflecting the more restricted ranges in the aptitude variables today. The results for SATv and SATm do not infer that they were necessarily non-contributing. It has been noted that they would have affected profoundly the scores of so-called over- and underachievers, particularly extreme cases, and their inclusion was worthwhile.

The high correlations of over .90 between academic discriminant scores and PSI, the prediction of GPA for the first semester in college derived from regression analysis are not unexpected, since the single function case of multiple discriminant analysis may be considered analogous to multiple point-biserial regression analysis with graduation introduced as a dichotomous variable. On the other hand, the size of the correlations indicating as they do that the scores of one approach a one-to-one correspondence with the scores of the other, suggest that graduation from Brown was and is a logical extension of high school classroom success. When academic success is the sole criterion, it would appear that the two types of analysis are about as efficient (or inefficient) as each other.

Non-Academic Discriminant

The reader is referred again to Table VII-11, specifically to the correlations between the non-academic variables and the non-academic discriminant scores.

The positive and substantial correlations between AI (derived from ratings of promise), EI (the index of environment), and the discriminant scores, revealed these to be the strongest separators, about equally as important for both the non-veterans of the old classes and the sample of recent classes. However, for Classes 1966-1968, LOMAS, the index of "joining" activities was also about equally as important but inverse in its effect. One implication of this for the recent sample is that a verbal risk who "stacked the deck" with the type of activities found in LOMAS effectively cancelled out counselor ratings of low academic promise or environmental effects. Another implication could be that students of lower verbal ability who were heavily involved in these types of activities in high school need to moderate such involvement in order to raise their potential for graduation. Apparently athletic involvement was not so crucial as involvement in scholastically related activities, but, it is interesting to speculate that the athletes may have enjoyed the privilege of tutoring, such as was not enjoyed by the student heavily involved in, for example, drama.

A by-product of the correlational analyses were the correlations found in Table VII-11 between academic variables and the non-academic discriminant scores and between non-academic variables and the academic discriminant scores. It was noted earlier that either an academic or a non-academic equation would be expected to be predictive of graduation for the non-veterans but not for recent classes. In Table VII-11 it is seen from the substantial correlations of SSR (.45) and SATm (.33) with the non-academic discriminant scores that they separated similarly the criterion groups of non-veterans. However, though correlations for SSR (.13) and CBAT (.13) were significant for Classes 1966-1968, they were also small, indicating that academic and non-academic variables performed quite differently in the different admission situation of recent classes.

On the other hand, correlations of .38 and .33 between AI and academic discriminant scores indicate that AI similarly separated graduates and non-graduates in both samples.

Substantially lower correlations between non-academic discriminant scores and PSI, the prediction of GPA for the first semester derived from regression analysis, of .46 for the non-veterans of the old classes and .19 for the recent classes, when compared with those of over .90 between academic discriminant scores and PSI, supported that the two types of prediction were different particularly for recent classes. The higher correlation for the old classes again reflected the closer likeness of the two types of discriminant scores, which found further support in their intercorrelation coefficient of .48 compared with .16 for the recent classes. The latter result was the more desirable. A low intercorrelation with a common criterion would support that the functions were acting differently. Thus each would predict graduates that the other would not. The academic function operating within the sample of recent verbal risks would tend to eliminate the underachiever and to predict the hard-working student as looking more like a graduate. The non-academic function would tend to eliminate the student with excess "joining" activities and to classify the highly recommended student from a more favorable environment as looking more like a graduate. One would expect the two equations to be complementary, and each is seen to have its unique characteristics.

A Function of Both Academic and Non-Academic Variables

An analysis of the contribution of academic and non-academic variables to corresponding discriminant functions would not be complete without an examination of their contribution when they are allowed to interact within a single equation. In Table VII-11 it is clear that AI acted very much like an academic variable and well it may, since counselors could be expected to take achievement into consideration when making their ratings. To what extent however would it discriminate between graduates and non-graduates when interacting with academic variables such as SSR, a traditionally good predictor of future academic success? It is also seen in Table VII-11 that EI for the old and the new classes were different, more like an academic variable in the former and unlike an academic variable in the latter. How would EI rank as a variable contributing to the power of a discriminant function to separate graduates from non-graduates when introduced along with academic variables?

All eight variables: SSR, SATv, SATm, CBAT, AI, EI, LAS, and LOMAS were introduced as variables into multiple discriminant analysis where the sample was the respondent verbal risks of Classes 1966-1968 ($N = 384$). The function derived had coefficients of 0.1533, -0.3322, -0.2022, 0.3122, 0.6279, 0.2099, 0.1492 and -0.5167 respectively for the variables. The test of H_2 was significant ($F = 2.04$; $P < .05$). The patterns of the academic and non-academic variables within the eight variables were consistent with the results when they were introduced separately. Within the academic variables the aptitude and achievement variables were opposite in sign, and within the non-academic variables LOMAS was opposite in sign to the remaining three.

To rank the variables as separators, all eight respectively were correlated with the discriminant scores derived from the eight variable equation, to result in correlations of .34, -.28, -.11, .27, .46, .41, -.07, and -.40. Rank order of the absolute values of correlations with discriminant scores indicative of the power of the variables to discriminate between graduates and non-graduates in a sample of verbal risks, was AI, EI, LOMAS, SSR, SATv, CBAT, SATm and LAS. The three leading contributors were non-academic variables outranking the traditionally strong SSR. Correlation between scores derived from the eight variable discriminant function and the non-academic discriminant function (.82) was found to be significantly greater ($t = 10.39$; $P < .01$) than with the academic function (.58). It is inferred that the eight variable function containing both academic and non-academic variables acted more like the non-academic function, and, to the extent that it maximized the value of the variables to separate graduates from non-graduates, the non-academic variables were stronger.

Cross-Validation

To cross-validate the classifications made from academic and non-academic discriminant scores, the scores were also derived for the remaining one-third stratified random samples of verbal risks. This made for a check upon a similar sample of students but not those from whose data the functions were derived. It was thus possible to examine the number of times a classification was accurate, validating on a concurrent basis somewhat like an actual admission office application. "Hits" and "misses" for the academic discriminant function are summarized in Table VII-12. For the non-veterans 1950-1952 and for the recent Classes

Table VII-12

Predicted Versus Actual: The Academic Discriminant Function

Predicted Group Membership	Actual Group Membership											
	Non-Veterans 1950-1952				Veterans 1950-1952				Classes 1966-1968			
	Graduates N = 135		Non-Graduates N = 57		Graduates N = 96		Non-Graduates N = 55		Graduates N = 216		Non-Graduates N = 56	
	N	% Hits	N	% Hits	N	% Hits	N	% Hits	N	% Hits	N	% Hits
Graduates	88	65.2	31	--	46	47.9	20	--	127	58.8	29	--
Non-Graduates	47	--	26	45.6	50	--	35	63.6	89	--	27	48.2

of 1966-1968, a majority of actual graduates were correctly classified by way of such an analysis. A completely different picture emerged for the veterans who exceeded the academic predictions that would have been made for them. The memory of their motivation and maturity continues pleasantly to be recalled by professors who taught them.

"Hits" and "misses" for actual graduates and non-graduates for the non-academic function are summarized in Table VII-13. Again, a majority were correctly classified as graduates for both the non-veterans and members of recent classes.

Table VII-13

Predicted Versus Actual: The Non-Academic Discriminant Function

Predicted Group Membership	Actual Group Membership							
	Non-Veterans 1950-1952				Classes 1966-1968			
	Graduates N = 135		Non-Graduates N = 57		Graduates N = 170		Non-Graduates N = 23	
	N	% Hits	N	% Hits	N	% Hits	N	% Hits
Graduates	78	57.8	34	--	111	65.3	13	--
Non-Graduates	57	--	23	40.4	59	--	10	43.5

Overall "hits" and "misses" are summarized in Table VII-14, where a "hit" is either a correctly classified graduate or a correctly classified non-graduate, for example, for the non-veteran academic function in Table VII-12, 88 plus 26 were "hits" and 31 plus 47 were "misses".

Table VII-14

Overall Hits and Misses

Results of Cross-Validation	Non-Veterans 1950-1952				Veterans 1950-1952		Classes 1966-1968			
	Academic N = 192		Non-Academic N = 188		Academic N = 151		Academic N = 272		Non-Academic N = 193	
	N	%	N	%	N	%	N	%	N	%
Hits	114	59.4	101	53.7	81	53.6	154	56.6	121	62.7
Misses	78	40.6	87	46.3	70	46.4	118	43.4	72	37.3

Since the cross-validation sample in each case was the remainder of the verbal risks and not the original criterion groups, the results found in Tables VII-12 through VII-14 suggest that potentially successful risks may be predicted by way of the technique of multiple discriminant analysis. Percentages of overall "hits" and "misses" for the non-veterans of 1950-1952 and recent members of Classes 1966-1968 for both functions are seen from Table VII-14 to be closely similar. It would seem that a battery of non-academic variables, such as proposed in this study, would have predicted graduation as well or better than the academic battery had it been available at the time of the admission of these students.

Prediction of graduation, however, is not sufficient for an admission officer. The probability of graduation in a group predicted to be graduates is much more important. In Table VII-15 is a summary of "hits" and "misses" in the samples of predicted graduates only. The results for the old classes indicate that had such a non-academic battery of predictors been available from which to derive a non-academic discriminant function, it would have been equally as efficient as an academic function derived from the academic pre-admission data that were available for those classes at the time of their admission.

Table VII-15

Hits and Misses: Predicted Graduates Only

Results of Cross-Validation	Non-Veterans 1950-1952				Veterans 1950-1952		Classes 1966-1968			
	Academic N = 119		Non-Academic N = 108		Academic N = 66		Academic N = 156		Non-Academic N = 124	
	N	%	N	%	N	%	N	%	N	%
Hits	88	73.9	78	72.2	46	69.7	127	81.4	111	89.5
Misses	31	26.1	30	27.8	20	30.3	29	18.6	13	10.5

The results for the sample of Classes 1966-1968 were much superior, and the reader is reminded that the samples are those of verbal risks. Close to 90% of the cross-validating sample of verbal risks who were classified as graduates on the basis of non-academic discriminant scores actually graduated versus 81.4% for academic discriminant scores, the difference in proportions falling just short of significance ($t = 1.89$; $P = .06$). This result not only strongly supports the value of non-academic variables but also the prediction model.

However, it is also clear that if the overall results were representative, then the admission officer in a highly selective college would have many more predicted graduates than he would need. As successful as the technique appears to be, it does not solve the admission officer's dilemma of helping him to eliminate many who would be academically successful in college, but for whom there are insufficient places to fill. Ninety per cent hits in the prediction of graduation may not be very efficient for a harassed admission officer, if he cannot admit more than a small fraction of them. The following solution, which combined the predictions of both types of functions, also met in part a major goal of the report, to find ways of defining potentially successful risks.

Predictions of Academic and Non-Academic Functions Combined

It has been noted that each function had its unique characteristics. Further, though the efficiencies of the academic and non-academic functions in the prediction of graduation were respectively 81.4% and 89.5%, it does not follow that their overlap was necessarily great.

When the categories are combined, four new sets of predictions emerge, as follows:

	Academic		Non-Academic
Group 1	Graduate	-	Graduate
Group 2	Graduate	-	Non-Graduate
Group 3	Non-Graduate	-	Graduate
Group 4	Non-Graduate	-	Non-Graduate

In other words, Group 1 would be those classified by both functions as graduates, Groups 2 and 3 as graduates by one of the functions but not by the other, and Group 4 as non-graduates by both functions. Group 1 would be the most desirable group, since not only would they be academically competitive but also, by virtue of the relationship between non-academic variables and success over the long-term, they would be expected to have much in common with those who may be rated successful several years after graduation from college or occupationally successful in the world of work.

The predictions derived in the cross-validating sample from both the academic and non-academic functions were combined, and summarized in Table VII-16.

Table VII-16

Predictions of the 1966-1968 Academic and Non-Academic Functions Combined

Actual Group Membership	Predicted Group Membership			
	Group 1 G-G#	Group 2 G-NG#	Group 3 NG-G#	Group 4 NG-NG#
Graduates (N = 170)	68	43	32	27
Non-Graduates (N = 23)	9	4	6	4

# Prediction from the academic discriminant function, first

Of Group 1, 68 actually graduated out of 77 predicted, about 88.3% efficient. Further, the group accounted for about two-fifths of the sample, which, from an admission officer's point of view, may also be efficient. The method makes for selection among those predicted to be graduates, and Group 1 is the most recommended group. On the other hand, some admission officers would welcome the added information of all categories.

The reader may question the improvement of a combination which was 88.3% successful when one of its parts, the non-academic function, was 89.5% successful. It is to be noted, however, that the non-academic function applied to the larger population of all candidates for admission, may well classify many as "looking like graduates" who lack the academic potential to succeed. In the combination of both functions, the academic function would remove such subjects. The reader may also question the extent to which Group 1 is superior when the proportions of graduates in the other groups were also high. Percents of themselves are but one of several dimensions to be considered; another is the nature of the group. Group 1 are those considered to be favorable on two accounts, academic and non-academic discriminant scores. Further, the results must be examined in the context that the subjects were part of an accepted population of students, all of whom, presumably, initially expected to succeed. A different set of proportions may be expected in the population of candidates for admission. It is in this population that Group 1 may be most meaningful from an admission officer's point of view.

It is not the recommendation of this report that the non-academic function should be used exclusively. There is an analogy for this in vocational prediction. A competent counselor would never recommend that a client could or should pursue, for example, a highly technical career without a careful appraisal of academic potential and achievement along with information derived from a non-cognitive interest inventory. That the results of interest inventories have historically failed to combine the two types of data is a long-standing shortcoming. The method of this study of combining predictions based upon both academic and non-academic data is deliberate and important.

Summary

The use of criteria other than immediate academic success in college was proposed. The possibility of predicting graduation was discussed in the light of a trend at Brown in recent years toward a plateau of means in traditional pre-admission data, making for a closer identity between criterion groups and groups to be predicted. The problem of retaining the non-graduates was solved by adopting the multiple discriminant analysis model instead of multiple regression analysis. A further advantage was noted in using the discriminant analysis in that it dispenses with the need for an academic average which will be less available as colleges increasingly turn to dichotomous grading (for example, pass-fail or pass-no credit). In place of a predicted academic average, the outcome of the proposed model is simply a classification that a candidate for admission looks more like a graduate or more like a non-graduate. Three sets of analyses were conducted, for the non-veterans and veterans of Classes 1950-1952 and Classes 1966-1968, the samples being delimited to those of verbal risks.

Academic variables were found to be more predictive of graduation than non-academic variables for the sample of Classes 1950-1952 when compared with the results for the sample of Classes 1966-1968. This, in part a function of the more restricted ranges in the variables found in the selective nature of admissions today, also pointed up the need for new non-traditional variables to assist the admission officer in the selection of those with potential for such success. A more detailed analysis of graduates and non-graduates was suggested by the results from the 1966-1968 data. Three groups of graduates were defined, those with a final academic average of 2.75 plus, those between 2.25 and 2.74, those below 2.25, and the non-graduates. Although the traditional academic pre-admission variables, SSR, SATv and CBAT significantly separated the four levels and descending means corresponding to levels of graduates were found for all variables including SATm, the descending order did not continue into the non-graduates whose means looked most like those of the middle graduate group. This would account for the lack of discrimination between graduates and non-graduates in these variables and also confirmed what deans have always known that those who drop-out are not necessarily the weakest in potential or the poorest in achievement.

On the other hand in the case of the non-academic variables, AI and EI, a significant trend was also found but with patterns of continuously descending means into the non-graduates. LAS was also a significant separator, but the highest mean corresponded to the lowliest graduates, and though LOMAS did not significantly separate, the mean for the non-graduates was clearly the highest. The results imply that prediction of graduation by way of an equation containing non-academic variables may be valuable in the more selective admission situation of today.

Multiple discriminant analyses were conducted on stratified random samples of two-thirds of the non-veteran and veteran verbal risks of Classes 1950-1952 and Classes 1966-1968, and cross-validated on the remaining one-third. All analyses resulted in significant separation of the graduate and non-graduate centroids in space, when the variables introduced were the traditional academic ones, SSR, SATv and SATm for the non-veterans and veterans, and SSR, SATv, SATm and CBAT, for Classes 1966-1968. The signs of the coefficients in the discriminant functions for the non-veterans and veterans were all positive. In the case of the function for the sample of Classes 1966-1968, however, those of the achievement variables (SSR and CBAT) were positive, and those of the aptitude variables (SATv and SATm) were negative. Such an equation would predict an overachiever to look more like a graduate and an underachiever to look more like a non-graduate. The reader is also referred to the results of analyses in Chapter X of all defined underachievers and overachievers in the total samples of recent classes. The results were complementary, in that defined underachievers were found to continue to be underachievers, and the academic discriminant function of this analysis appeared to single out the underachiever to classify him as looking more like a non-graduate.

SSR was found to be the strongest separator of graduates and non-graduates in the academic variables, followed by SATm for the verbal risks of the old classes. CBAT and SSR were the strongest separators for the sample of recent classes. The adage that past academic success is predictive of future academic success was once again confirmed, this time in a sample of verbal risks. Further, it would also appear from the results for recent classes, that a high SATm score did not necessarily compensate for a low SATv score, insofar as a sample of students with comparatively low SATv scores was concerned. The importance of this finding for an admission officer could apply to the selection of students for scientific programs, and again the reader is referred to Chapter X for a study of students of recent classes who presented imbalanced scholastic aptitude scores at the time of admission.

Lack of significance in the separation of graduate and non-graduates was found for the veterans, when the non-academic variables were introduced into multiple discriminant analysis, but the analyses for the verbal risk samples of non-veterans and recent classes were successful. AI, the measure of ratings, closely followed by EI, the Environmental Index, was the strongest separator. The effects of the activity indices tended to oppose those of AI and EI. The signs of EXC I and LOMAS were inverse to the sign of the remaining variables in the equation, and LOMAS in the sample of Classes 1966-1968 was about as strong a separator as EI, but inverse in effect. The results indicated for these samples that the more a candidate for admission "stacked the deck" with "joining" types of activities such as found in LOMAS the more the equation would make him look like a non-graduate. Another implication, from a positive point of view, could be that a verbal risk heavily engaged in such activities in the secondary school needed to moderate such involvement to raise his potential for graduation.

In order to examine the relative contribution of academic and non-academic variables both sets were introduced together into multiple discriminant analyses and allowed to interact. The sample was all respondents, Classes 1966-1968. Significant separation of graduate and non-graduate centroids was found, and the patterns of the signs of the eight variables in the single function were consistent with their signs in the separate academic and non-academic functions. The aptitude and achievement variables were opposite in sign, and the sign of LOMAS was opposite to that of AI, EI and LAS. Rank order of the eight variables as separators was found to be: AI, EI, LOMAS, SSR, SATv, CBAT, SATm and LAS. The three leading contributors were non-academic. Further, when the discriminant scores of the 8-variable function were correlated with those of the 4-variable non-academic function (.82) and the 4-variable academic function (.58), the correlations were found not only to be significantly different but also to support that the 8-variable function was more like the non-academic function. To the extent that multiple discriminant analysis maximized the power of variables to separate groups, the non-academic variables were clearly the more powerful separators of graduates and non-graduates in the sample of verbal risks of Classes 1966-1968.

"Hits" and "misses" were examined in a cross-validating sample. A majority of non-veteran graduates of Classes 1950-1952 and graduates of Classes 1966-1968 in the samples of verbal risks would have been predicted correctly by either the academic or non-academic functions. Of those predicted in Classes 1966-1968 to be graduates by the academic function, 81.3% actually graduated, compared with 89.5% by the non-academic function. Since the two functions were shown to have unique characteristics, and from the examination of a single function containing both types of variables no advantage was noted in combining them, a method was proposed to combine the predictions of the separate equations. The most recommended candidate would be he who was classified as a graduate by both equations. Elimination of the others would eliminate about 60% of the applicants meeting a need of admission officers to reduce the burden of admissions to a carefully chosen subsample. A probability of graduation of about .88 was found in the group of verbal risks dually predicted to be graduates.

CHAPTER VIII

SUCCESS BEYOND GRADUATION

It is a cliché that graduation of itself is not an end but a beginning, and it is not an accident that graduation exercises are known as commencement activities. However, there is a profound difference, apart from the obvious differences, between graduation from high school and graduation from college. The beginning that is associated with going to college is, for many, not a beginning at all, but a mere changing of gear as socially directed forces propel the student in the academic race to the fulfillment of socially desirable goals. As he approaches graduation from college, however, the student increasingly becomes the architect of his own career, sometimes even dropping out of college, although in good academic standing, when he fails to find purpose in the race. Those who do not go to college and those who drop-out usually enter the world of non-professional work, traditionally considered to be "inferior" to professional work. Commencement at the end of four years of college is yet another changing of gear for many of the graduates who continue into graduate schools where admission requirements focus in good measure upon academic success. The elite are those who have high grades or make the honors. Finally, the PhD is conferred upon those who survive it all, and, as they enter the world of work, they must often wonder how much was truly relevant to their life goals and how much was the routine fulfillment of academic requirements.

Chapter VII was concerned with the prediction of graduation. It is basic to this report, however, that academic emphasis is a limited approach to the wider success of people, even of those who choose to go to college. Acquisition of diplomas is only one of several dimensions of success. It was for this reason that attempts were made in this study to build multiple models of later success moving from the outside quantifiable measures of success to more subjective and global ratings. However, one more academic criterion was examined, that of attainment of an advanced degree. This chapter is concerned with the fact of graduation, attainment of an advanced degree, a global rating of success by reputation 15-17 years beyond graduation from Brown and their relationship to each other.

Criterion of Attainment of an Advanced Degree

Attainment of an advanced degree may be an important component of the further success of graduates, especially of colleges such as Brown, whose reputation in part rests upon the numbers who go on to graduate schools. Alumni records of Classes 1950-1952 were scanned for all known to have attained one or more advanced degrees. Since the graduates of Classes 1966-1968 were so recent at the time of writing, a modified criterion of having entered graduate school was adopted for limited examination of this sample, but the emphasis of the study was upon the non-veterans and veterans of the old classes.

Questions of importance were: To what extent did students of the old classes attain an advanced degree? How did the veterans compare with the non-veterans? To what extent were students successful without attainment of an advanced degree? To what extent were the members of a lower verbal ability group competitive with their more able peers both in attaining such a degree and enjoying reputation for success in later years? Did pre-admission variables discriminate between those known to have attained an advanced degree and those not known? These questions and others are examined in this chapter.

Criterion of Reputation for Success over the Long-Term

Previous and following chapters are concerned with graduation and occupational success. Academic and professional accomplishment, however, do not completely make for success. One can have both, yet be a colorless unknown. They are therefore only partial or lesser measures of global success. There is a category, reputation for success, which subsumes the lesser accomplishments and often overrides them, and which was made a second criterion for examination in this chapter.

An examination of the Charter of Rhode Island College, as Brown was first known in the eighteenth century, reveals the purpose of the college to be that of "preserving in the Community a Succession of Men duly qualify'd for Discharging the Offices of Life with usefulness and reputation". Clearly, the college saw itself as an institution for educating people to go out to do things not just usefully but with reputation. Reputation for success is beyond the acquisition of degrees, often independent of them, and not necessarily determined by the paper records of ability and achievement. The following criteria were determined as indicators of "usefulness and reputation":

a) Reputation for academic or research accomplishment
b) Status or position in employment
c) Status in or contributing to the local community
d) Contributing to the larger (national) community
e) Contributing of himself to his alma mater, Brown
f) Income by reputation
g) A catch-all of reputation for success

Such data could be highly subjective, but this was offset by using independent judges and the series of dimensions (a through g). Groups of alumni from Classes 1950, 1951 and 1952 were brought together under the chairmanship of the Director of Admissions. Each judge had a list of students from his own class, and each had been chosen for his familiarity with alumni colleagues. In a series of meetings they went through the lists name by name and established a consensus for each classmate that he was successful on any of the criteria. Reputation for having successfully filed several patents could merit a success rating in (a) and having a magnificent home similarly in (f). Category (e), an indirect index of success, was predicated upon the premise that alumni who give attribute in part their success to the institution. The (g) rating was a deliberate catch-all for anyone who did not fit the other categories but who had gained the attention of people. The judges were instructed to be highly selective in their use of the basic criteria.

Since the judges were necessarily drawn from the Boston and Providence area, it was feared that a geographical bias would be extant in the data. A search was made of Who's Who and other national biographies to find those who had gained the attention of the panels of judges who collect for such biographies. No biography in which a person could place himself for the purpose of advertisement was used nor any that were considered to be strictly commercial enterprises. It was evident that many who were added were scientists, lawyers, scholars, writers and others who could be considered academic in bias.

A third and objective means of determining a sample of successful people met the need for wide geographic representation without bias for any particular group. Students were solicited to search the Brown Alumni Monthly, and to select from the relevant classes names of people who met the criteria (a through g). Alumni in general are asked to supply information concerning themselves for possible publication in the magazine. The reports are carefully sifted at the Alumni Office, so that to be chosen for inclusion carries some distinction or newsworthiness. In addition to following the basic criteria, the student judges were asked to err to the conservative, in other words not to include anyone for whom there was any doubt that he was in their opinion successful. This examination added among others two particular groups, businessmen and successful career servicemen. Alumni magazines preceding 1960-1968 were not used, partly to avoid the flush of returns that are made early after graduation and partly to meet the purpose of the criterion, that of determining a sample of people successful several years beyond graduation from college.

In summary, a sample of the Classes 1950-1952 was determined of people considered by their class peers to have become successful over the long-term, or who had been brought to the attention of panels of judges who recommend people for inclusion in national biographies such as the Who's Who, or were judged by a group of current students as successful on the basis of their biographies included in the Brown Alumni Monthly. Whereas bias was avoided through the several determinations of the sample, the writer acknowledges that there would still be some bias, for example, the peers could hardly be blamed for recalling best those they knew best in college. On the other hand, basic criteria were followed, and the sample was determined independently of the writer. The sample became all those rated successful in any of the determinations. The remainder became the sample of those not rated successful, not necessarily inferring that they all lacked success, but that they had not come to the attention of the several panels of judges; in other words, they lacked reputation for success.

A basic question was the extent to which the members of the ability groups were rated successful 15-17 years beyond graduation from college. In a comparison of veterans and non-veterans, the extent to which the more mature students fared over the long-term in competition with those who graduated younger from college was considered timely not only because the current GI Bill will repeat a returning veteran situation when peace prevails in Vietnam but also to shed light upon consequences for any students who delay going to college. The relationship between graduation, attainment of an advanced degree and success by reputation was also examined. Since the study was basically concerned with pre-admission predictors, the extent to which pre-admission data, both academic and non-academic, would discriminate between those rated successful and those not rated successful in a sample of verbal risks was important, use being made of the limited sample of recent classes to check the findings for current admission purposes.

Success within Non-Veterans and Veterans: The Total Sample

Total counts of non-veterans and veterans were compared in terms of the three criteria of success, and the groups were found significantly to differ. Counts, per cents and the results of tests of the differences between proportions are reported in Table VIII-1. Although also significantly different, the results for graduation were different from those for the other criteria. Proportionately, almost as many veterans (69.5%) as non-veterans (73.9%) graduated, although for all traditional pre-admission data, SSR, SATv, SATm, HSAV and PSI, differences between means for the groups at the time of admission significantly favored the

Table VIII-1

Comparisons of Non-Veterans and Veterans by Three Success Criteria, Classes 1950-1952

Three Criteria of Success	Non-Veterans N = 1222		Veterans N = 905		χ^2
	N	%	N	%	
Graduated	903	73.9	629	69.5	4.77 *
Advanced Degree	422	34.5	170	18.8	63.42 **
Rated Successful	357	29.2	169	18.7	30.47 **

* $P < .05$; ** $P < .01$
For all χ^2, d.f. = 1

non-veterans beyond the 1% level. Further, when the two groups of graduates were examined on graduation average, they were found to have identical mean graduation averages (2.08). The motivation of the veterans at the undergraduate level is still recalled with pleasure by those who taught them.

Yet, it is seen from Table VIII-1 that though the veterans had closely equalized with their younger peers at the time of graduation, they drew apart when considered in terms of criteria beyond graduation. The ratio of the proportion of non-veterans who attained an advanced degree or were rated successful 15-17 years beyond graduation to the proportion of veterans was more like 5:3 in favor of the younger group. Perhaps the toll in years of military service followed by a delayed college education, complicated by possible economic or family needs, made ultimate for the veterans the attainment of graduation from college, a mere stepping stone for those with the advantage of youth on their side. It would seem that the primary goal of the veteran was the immediate one of the baccalaureate degree, a goal which may have appeared remote for many prior to military service. In other words, the more mature student was highly motivated but immediately goal oriented. He would settle for reasonable security rather than risk the potentially more rewarding but more dangerous course calling for further delay of career.

Success within Ability Groups:
The Total Sample

Non-veteran and veteran ability groups were then compared in terms of the three basic success criteria. Counts, per cents and results of tests of the significance of the differences in proportions are found in Table VIII-2. For both non-veterans and veterans, although the proportions of graduates significantly favored the higher verbal ability group, yet, 70.3% of the non-veterans with SATv scores lower than 500 at the time of admission and 63.6% of the veterans with SATv scores lower than 480 graduated from Brown Classes 1950-1952, compared with

Table VIII-2

Analyses of Counts within Non-Veteran and Veteran Success Groups Defined by Ability: Classes 1950-1952

Three Criteria of Success	Non-Veterans N = 1222					Veterans N = 905				
	Verbal Non-Risks N = 650		Verbal Risks N = 572		χ^2	Verbal Non-Risks N = 455		Verbal Risks N = 450		χ^2
	N	%	N	%		N	%	N	%	
Graduated	501	77.1	402	70.3	6.94 **	343	75.4	286	63.6	14.38 **
Advanced Degree	283	43.5	139	24.3	48.96 **	109	24.0	61	13.6	15.37 **
Rated Successful	209	32.3	148	25.9	5.50 *	82	18.0	87	19.3	0.18

	Verbal Non-Risks N = 1105					Verbal Risks N = 1022				
	Non-Veterans N = 650		Veterans N = 455		χ^2	Non-Veterans N = 572		Veterans N = 450		χ^2
	N	%	N	%		N	%	N	%	
Graduated	501	77.1	343	75.4	0.34	402	70.3	286	63.6	4.88 *
Advanced Degree	283	43.5	109	24.0	43.99 **	139	24.3	61	13.6	17.80 **
Rated Successful	209	32.2	82	18.0	26.83 **	148	25.9	87	19.3	5.72 *

* $P < .05$; ** $P < .01$
For all χ^2, d.f. = 1

about three-quarters of those with scores above. Corresponding proportions of graduates for the two ability groups of the total sample of Classes 1966-1968 were 79.6% for all accepted with an SATv score under 620 versus 84.3% of those above. Clearly, if graduation is a desirable goal for a student accepted to Brown, and if one of the uses of the SATv is to assist an admission officer to discriminate between those who may or may not graduate, then this would appear to be a variable of limited usefulness. The findings do not support that candidates for admission with comparatively low SATv scores are so very inferior. The earlier finding for recent classes of a correlation of about .38 between SATv and EI, the Environmental Index, suggests that SATv may be a function of background. In this report the variable is used principally to define risks, not for the purpose of their elimination, but from them to find those who may be successful. The proportions of graduates in the three samples of the study support this positive approach and use of the variable.

It is also seen from Table VIII-2 that the higher ability veteran in Brown was competitive with his younger rival, but the lower ability veteran was less competitive. The inference for admission policy is that returning veterans of substantial verbal ability did not suffer academically by being removed for several years, insofar as proportions of graduates were concerned.

However, a substantially different picture emerged for attainment of an advanced degree. Regardless of grouping, non-veteran or veteran, higher ability or lower ability, the ratio of proportions were about 2:1 respectively. In other words, the younger and verbally more able student had the edge for graduate school. One may speculate that this was related to graduate school requirements. On the other hand, the younger less able non-veterans may have settled for graduation from college like the more mature veterans.

The differences between ability groups were not so pronounced, when the criterion was that of success by reputation 15-17 years beyond graduation from college, respectively about one-third and one-quarter in the non-veteran higher and lower ability groups and about one-fifth in each of the veteran ability groups. The differences in proportions were significant for the non-veterans and not significant for the veterans. Not only did the results suggest some independence between such success and attainment of an advanced degree but also that success by reputation several years beyond graduation from college was not strongly related to verbal ability grouping.

Success Combinations

The results of the examinations of three success criteria found in Table VIII-1 and Table VIII-2 give the appearance of three independent dimensions of success. Obviously they are not. Finer examinations call for success combinations, for example, the extent to which a rating of success over the long-term was a function of having an advanced degree.

A summary of counts and per cents in terms of non-veteran and veteran ability groups is found in Table VIII-3. The focus of interpretation is upon the verbal risk and the extent to which he was competitive. The design is seen to be pyramidical from graduation, through advanced degree, to all those rated successful. First, all who graduated (or did not) are subdivided into those who went on to attain an advanced degree or to be rated successful 15-17 years beyond graduation from college. The next set, all who attained an advanced degree (or did not) are examined for those of them who were rated successful. The third set, all rated successful (or not rated) looks back to the numbers of them who graduated from Brown or who attained an advanced degree.

The discussions which follow consider each in turn, and the reader is referred to Table VIII-3 to examine consecutively each set of multiple success criteria and the denominators which determined the per cents. The procedure was

Table VIII-3

Summary of Counts and Per Cents of Successful and Less Successful Groups

Success Criteria	Successful Groups								Less Successful Groups							
	Non-Veterans				Veterans				Non-Veterans				Veterans			
	Verbal Non-Risks		Verbal Risks		Verbal Non-Risks		Verbal Risks		Verbal Non-Risks		Verbal Risks		Verbal Non-Risks		Verbal Risks	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
	Graduated				Graduated				Not Graduated				Not Graduated			
	N = 501		N = 402		N = 343		N = 286		N = 149		N = 170		N = 112		N = 164	
Holds Advanced Degree	257	51.3	128	31.8	100	29.2	53	18.5	26	17.4	11	6.5	9	8.0	8	4.9
Rated Successful	193	38.5	136	33.8	72	21.0	72	25.2	16	10.7	12	7.1	10	8.9	15	9.1
	Advanced Degree				Advanced Degree				No Advanced Degree				No Advanced Degree			
	N = 283		N = 139		N = 109		N = 61		N = 367		N = 433		N = 346		N = 389	
Rated Successful	153	54.1	65	46.8	41	37.6	25	41.0	56	15.2	83	19.2	41	11.8	62	15.9
	Rated Successful				Rated Successful				Not Rated Successful				Not Rated Successful			
	N = 209		N = 148		N = 82		N = 87		N = 441		N = 424		N = 373		N = 363	
Graduated from Brown	193	92.3	136	91.9	72	87.8	72	82.8	308	69.8	266	62.7	271	72.6	214	59.0
Holds Advanced Degree	153	73.2	65	43.9	41	50.0	25	28.7	130	29.5	74	17.4	68	18.2	36	9.9

to compare ability groups within all non-veterans and veterans and then to compare like ability groups across non-veterans and veterans. Contingency tables (2x2), consisting of the proportions under consideration and the remainders of the groups, were examined for the significance of the difference between proportions.

Brown Graduates and Non-Graduates Having an Advanced Degree

Over one-half (51.3%) of the non-veteran graduates of the higher verbal ability group attained an advanced degree compared with about one-third (31.8%) of the verbal risk graduates, the difference being significant ($\chi^2 = 33.73$; $P < .01$). Similarly, the difference between the proportions of graduates in the veteran ability groups, respectively less than one-third (29.2%) and less than one-fifth (18.5%), significantly favored the higher ability group ($\chi^2 = 8.99$; $P < .01$). The results show that there was a relation between the attainment of an advanced degree and ability grouping, favoring the higher ability group for both non-veterans and veterans.

When like ability groups were compared, a significantly higher proportion of non-veterans was found for both the verbal non-risks ($\chi^2 = 40.00$; $P < .01$) and for verbal risks ($\chi^2 = 14.59$; $P < .01$). Further, non-significantly different proportions were found for non-veteran lower ability group (31.8%) and the veteran higher ability group (29.2%). The implication of the results for admission purposes is that if the probability of attaining an advanced degree is part of the decision process when admitting students to the undergraduate college, then the advantage was not only with the younger candidates directly from high school but also, taken as a group, the less verbally able of them were proportionately as successful as the more able veterans. In other words, the important difference between non-veterans and veterans may have been aspiration, with aspiration a function of age.

The proportions of non-graduates of Brown (some of whom would have graduated elsewhere) who attained advanced degrees ranged from a high of 17.4% for the non-veteran verbal non-risks to a low of 4.9% for the veteran verbal risks. The proportion of successful non-veteran non-graduates of higher verbal ability (17.4%) was significantly greater ($\chi^2 = 8.30$; $P < .01$) than the proportion of corresponding successful verbal risk non-graduates (6.5%), and also significantly greater ($\chi^2 = 4.10$; $P < .05$) than the proportion of successful veteran non-graduates (8.0%) of like ability. The results indicate that of the non-graduates only minimal numbers of any kind of veterans and only minimal numbers of non-veteran verbal risks continued through to the attainment of an advanced degree. Only the more able non-veterans were able to achieve this success, and the probability for them was less than one in five.

Graduates and Non-Graduates Rated Successful

Just over one-third (38.5%) and about one-third (33.8%) of the non-veteran graduates of higher and lower verbal ability groups were rated successful over the long-term. The difference in proportions was not significant ($\chi^2 = 1.92$; $P > .05$). The proportions of similarly successful graduates in the veteran ability groups were respectively about one-fifth (21.0%) and about one-quarter (25.2%), and again the difference was not significant ($\chi^2 = 1.32$; $P > .05$). The results imply for both non-veterans and veterans that, having graduated, such long-term success was independent of verbal ability. This has implications for admission policy, since it has been shown that a high proportion of verbally less able students eventually graduate (about two-thirds or more of both non-veterans and veterans). One is urged to ask what are the long-term goals of a college such as Brown or of its admission policy? If they are limited to those of academic distinction, high selectivity may be justified to meet the criteria for admission into graduate schools. If, however, the goals are related to a wider domain of of success, then high selectivity could eliminate many desirable people who could have served the nation "with usefulness and reputation". Clearly, insofar as the samples of 1950-1952 were concerned, the key was to be graduated. Having effected this, the verbal risk had about equal probability with that of his more able peer of being rated successful over the long-term.

When like verbal ability groups were compared, the proportions of graduates rated successful significantly favored the non-veterans for both the verbal non-risks ($\chi^2 = 28.24$; $P < .01$) and for the verbal risks ($\chi^2 = 5.53$; $P < .05$). The results suggest that the older veterans were competitively at a disadvantage after they left college.

The proportions of non-graduates also rated successful ranged from a high of 10.7% to a low of 7.1% for the higher and lower non-veteran ability groups. Clearly, success over the long-term, as defined in this study, was considerably more easily attainable by the graduate, the probability of such success for the non-graduate being about one in ten or less.

All with or without Advanced Degrees Who were also Rated Successful

Of the non-veterans who had advanced degrees, about one-half of them were rated successful in both the higher ability group (54.1%) and the verbal risks (46.8%). The difference was not significant ($\chi^2 = 1.71$; $P > .05$). Similarly, but with slightly less proportions of about two-fifths each, there was a non-significant difference ($\chi^2 = 0.07$; $P > .05$) between the proportions of verbal non-risks (37.6%) and verbal risks (41.0%). The results closely parallel those found when the criterion was that of graduated and rated successful, in that having attained an advanced degree, for both non-veterans and veterans long-term success was apparently independent of verbal ability grouping.

When like ability groups were compared, the fact of being a non-veteran or veteran was found to be important for the higher ability groups. Significantly more of the younger non-veterans had advanced degrees and were also rated successful ($\chi^2 = 7.87$; $P < .01$). However, this finding was not replicated for the veteran verbal risks ($\chi^2 = 0.36$; $P > .05$). It is to be noted that the group which had the lowest proportion of successes was the higher ability veterans, and this is difficult to explain. However, the veterans, regardless of ability, may not have been inclined to continue through graduate schools. On the other hand, however uninclined the veteran verbal risk was to continue in higher education, non-veteran verbal risks were apparently either no more inclined or not accepted.

More verbal risks (19.2%) than non-risks (15.2%) of the non-veterans and also more verbal risks (15.9%) than non-risks (11.8%) of the veterans, without advanced degrees, were rated successful. The proportions were not significantly different both between and across ability groups. These results taken with those above indicate that with or without an advanced degree, being rated successful 15-17 years beyond graduation from college was about equally probable for the two ability groups.

All Rated or Not Rated Successful Who Graduated from Brown

Close to all of the non-veterans of higher verbal ability (92.3%) and of the verbal risks (91.9%), who were eventually rated successful had also successfully graduated from Brown. The difference between the proportions was not significant ($\chi^2 = 0.00$; $P > .05$). Although the respective proportions of graduates rated successful in the veterans of higher verbal ability (87.8%) and the verbal risks (82.8%) were slightly lower, the difference between proportions was similarly not significant ($\chi^2 = 0.50$; $P > .05$). Also, when like ability groups were compared, non-significant differences between the proportions of non-veteran and veteran graduates were found for both the higher ability groups ($\chi^2 = 0.99$; $P > .05$) and the verbal risk groups ($\chi^2 = 3.64$; $P > .05$). The results confirm not only that graduation was an essential component of long-term success as defined in this study but also that it mattered little whether the Brown graduate were a non-veteran or veteran, or higher or lower verbal ability group, once graduated, the probability of his being rated successful over the long-term was about equal.

A significant difference was found between the proportions of non-veteran higher verbal ability graduates (69.8%) and corresponding verbal risk graduates (62.7%), who were not rated successful ($\chi^2 = 4.58$; $P < .05$). Similarly, the difference between veteran graduates of higher ability (72.6%) and veteran verbal risk graduates (59.0%) not rated successful was also significant ($\chi^2 = 14.76$; $P < .01$). In other words, significantly lower proportions of verbal risk graduates, for both non-veterans and veterans, were not rated successful, inferring that the verbal risk graduates were more successful than their more able peers in avoiding lack of success over the long-term.

All Rated or Not Rated Successful Who Had an Advanced Degree

Nearly three-quarters (73.2%) of the non-veterans of higher ability rated successful held an advanced degree, compared with less than half (43.9%) of the corresponding verbal risks. The difference was significant ($\chi^2 = 30.04$; $P < .01$). Half (50.0%) of the veterans of higher ability compared with just over one-quarter (28.7%) of the corresponding verbal risks rated successful also had advanced degrees. Again the difference was significant ($\chi^2 = 7.15$; $P < .01$). The results not only confirm the relationship between attainment of an advanced degree and ability grouping but also suggest that such achievement was a less important component of long-term success for the verbal risks. The results imply that the verbal risk either entered work where such a degree was not so necessary or that other qualities made for their getting along without one.

When like ability groups were compared, significantly higher proportions of non-veterans than veterans rated successful were found to have acquired advanced degrees for both the higher ability groups ($\chi^2 = 13.25$; $P < .01$) and the verbal risk groups ($\chi^2 = 4.72$; $P < .05$). When compared with peer ability groups, veterans rated successful were significantly less likely to have continued through graduate schools.

It is seen from Table VIII-3 that for both non-veterans and veterans the ratios of the proportions who had advanced degrees among those rated successful and not rated successful approached 3:1, regardless of ability grouping. Clearly, the possession of an advanced degree improved the probability of being rated successful over the long-term for everybody, probably because such achievement was a material part of an individual's growth in job and status. However, substantial proportions of those who were not rated successful also had advanced degrees; nearly one-third (29.5%) of the higher ability non-veterans, 17.4% of non-veteran verbal risks, 18.2% of higher ability veterans, and a low of 9.9% of the veteran verbal risks.

Pre-Admission Data and Criteria of Advanced Degree and Reputation for Success

The extent to which high school pre-admission data of verbal risks were predictive of graduates was explored in Chapter VII. The discriminative properties of such data with respect to success beyond graduation is explored in this chapter. Again the study was delimited to verbal risks, but analyses of data for Classes 1966-1968 were added to examine in particular the properties of the non-academic variables for recent classes in terms of a criterion beyond that of graduation from college. A substitute criterion was called for, that of having entered graduate school, the graduation of these classes from Brown being so close to the writing of the report for most not to have had time to attain an advanced degree. A similar analysis with a criterion of rated successful over the long-term was impossible for Classes 1966-1968.

Attainment of an Advanced Degree

Univariate statistics of verbal risks for all known or not known to have attained advanced degrees for both non-veterans and veterans, and for those of Classes 1966-1968 known or not known to have entered graduate schools, are found in Table VIII-4. The results for the non-veterans of Classes 1950-1952 and Classes 1966-1968 amount to repetition. Variables of academic achievement in high school, SSR and HSAV or CBAT, continued to manifest their traditional role as discriminators when the criterion was academically related. Those who attained an advanced degree (for Classes 1966-1968, those known to have entered graduate school) and those who did not were also not only significantly separated on GPA at the end of the first semester in college but also in PSI, the local prediction of GPA. Only SATm of the academic variables failed significantly to separate groups for all three groups. SATv failed for the veterans only. In other words, those who eventually attained an advanced degree (or entered graduate school in the case of recent classes) were generally those who at the time of admission from secondary school presented superior academic credentials.

Three of the four non-academic variables used in this study were also found to be substantial discriminators. The decisive results for AI indicated that the opinions of raters in regard to the academic promise and motivation of candidates for admission to college were also predictive of their continuing beyond graduation into graduate schools and in the case of the old classes of actual attainment of an advanced degree. The results for EI indicated that there may be a relationship between the pre-college environment of the home-school-community and the criterion, although the results for veterans lacked significance. From the results of EXC I or LAS, measures of athletic involvement in high

Table VIII-4

Univariate Statistics of Pre-Admission Variable and GPA for Verbal Risks With and Without Advanced Degrees in Three Samples[a]

Variable	Non-Veterans 1950-1952					Veterans 1950-1952					Classes 1966-1968				
	With Degree N = 139		No Degree N = 433		t#	With Degree N = 61		No Degree N = 389		t#	Entered Graduate School N = 298		Not Entered Graduate School N = 514		t#
	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
SSR[a]	68.84	24.70	58.74	26.16	4.13 **	65.30	23.38	51.37	27.04	4.23 **	62.85	7.45	60.91	7.38	3.59 **
SATv	44.29	3.92	43.08	4.36	3.08 **	41.46	4.78	40.69	4.65	1.17	55.84	4.40	55.12	4.71	2.19 **
SATm	54.25	8.38	53.58	8.30	0.82	49.30	8.00	48.63	7.83	0.61	63.11	7.44	63.10	7.34	0.02
HSAV[b]	2.87	0.66	2.53	0.66	5.28 **	2.70	0.53	2.40	0.63	4.00 **	57.95	5.80	57.09	5.88	2.03 **
AI	12.82	1.77	12.11	1.64	4.19 **	12.27	1.57	11.59	1.88	3.06 **	19.32	2.49	18.64	2.88	3.54 **
EI	3.67	1.53	3.26	1.54	2.74 **	3.97	1.59	3.68	1.53	1.33	50.26	10.62	47.18	9.68	4.11 **
EXC I[c]	4.21	4.49	5.44	4.88	2.75 **	3.56	4.20	4.51	4.72	1.61	6.12	3.35	6.67	3.46	1.91 *
EXC II[d]	4.10	3.28	3.64	3.36	1.43	3.10	3.42	2.62	3.00	1.04	4.81	3.63	5.06	3.88	0.79
PSI	2.15	0.41	1.97	0.44	4.42 **	2.00	0.38	1.79	0.43	3.94 **	2.18	0.32	2.08	0.34	4.20 **
GPA	2.22	0.64	1.78	0.65	7.03 **	2.19	0.69	1.84	0.66	3.70 **	2.35	0.53	1.96	0.59	9.70 **

* P < .05; ** P < .01

One-tailed test: Mean of successful groups > less successful groups for all variables except for EXC I or LAS

For Classes 1966-1968: a = Standard SSR; b = CBAT; c = LAS; d = LOMAS and for c, d, N = 237 and 340 (respondents) school, more involvement would appear to have been significantly associated with those who either did not attain an advanced degree or who did not go onto graduate school. EXC II and LOMAS, the measure of "joining" activities in high school, were not discriminating variables for this criterion in any of the analyses.

In summary it would seem that if in choosing secondary school candidates for admission to college, their potential for eventually entering a graduate school and attaining an advanced degree is important, both the traditional and the non-traditional variables supply an abundance of predictive information for an admission officer. The quality of verbal facility and academic achievement in the secondary school and of the local prediction of GPA for the first semester in college, would appear to be significant predictors. In other words, attainment of an advanced degree appears to be little more than a link in the chain of academic success from high school through college to graduate school. An admission officer would also be assisted in his decisions by noting those who are recommended higher by their school counselors, who come from more fortunate environments, and who involve themselves less in activities such as athletics.

Rated Successful by Reputation

Univariate statistics for all non-veterans and veterans of Classes 1950-1952 rated and not rated successful are found in Table VIII-5. Comparison of Table VIII-5 with Table VIII-4 shows that the samples and results for criteria of attainment of an advanced degree and reputation for success were different, generally lower means of academic variables applying to those rated successful. No pre-admission academic variable discriminated between those rated successful and those not so rated in the veterans. Rank in class (SSR) and high school average (HSAV) discriminated in the case of the non-veterans, but it has been

Table VIII-5

Univariate Statistics of Verbal Risks Rated and Not Rated Successful Non-Veterans and Veterans, Classes 1950-1952

Variable		Non-Veterans 1950-1952			Veterans 1950-1952		
		Rated Successful N = 148	Not Rated Successful N = 424	t#	Rated Successful N = 87	Not Rated Successful N = 363	t#
SSR	Mean	65.30	59.76	2.25 *	51.26	53.73	0.77
	S.D.	25.56	26.23		26.81	27.03	
SATv	Mean	43.42	43.36	0.15	40.84	40.78	0.11
	S.D.	4.10	4.35		4.73	4.67	
SATm	Mean	54.08	53.62	0.55	48.75	48.72	0.03
	S.D.	9.04	8.06		8.39	7.72	
HSAV	Mean	2.75	2.56	2.87 **	2.43	2.45	0.28
	S.D.	0.70	0.67		0.59	0.69	
AI	Mean	12.48	12.21	1.65 *	11.84	11.65	0.80
	S.D.	1.72	1.68		2.03	1.81	
EI	Mean	3.61	3.27	2.28 *	3.43	3.79	1.90
	S.D.	1.57	1.53		1.60	1.52	
EXC I	Mean	4.74	5.28	1.15	6.07	3.98	3.33
	S.D.	4.95	4.76		5.45	4.36	
EXC II	Mean	3.95	3.68	0.85	3.69	2.45	3.00 **
	S.D.	3.30	3.36		3.59	2.87	
PSI	Mean	2.07	2.00	1.69 *	1.78	1.82	0.81
	S.D.	0.43	0.44		0.41	0.43	
GPA	Mean	2.10	1.81	4.78 **	2.06	1.85	2.51 **
	S.D.	0.62	0.68		0.71	0.66	

* P < .05; ** P < .01

One-tailed test: Means of successful groups > less successful groups for all variables except EXC I

noted that the non-veterans included a higher proportion of those who attained an advanced degree. The local academic prediction was also indecisive. However, actual achievement measured by GPA for the first semester in college was significant, indicating a positive relationship between academic success in college and reputation for success 15-17 years beyond graduation. The aptitude variables SATv and SATm failed to discriminate between the successful and less successful groups. In other words, for a criterion of reputation for success several years beyond the completion of formal education, academic variables presented at the time of admission to college appeared to have limited usefulness, insofar as these samples were concerned.

The non-academic variables acted consistently for the non-veterans as they have throughout the report for a more academic group. Significantly higher AI and EI means corresponded to the more successful group. The mean of EXC I, the variable of athletic activities, was lower, and the mean of EXC II, the variable of scholastic activities, was higher, but in neither case significant insofar as this criterion was concerned. The results for the veterans were quite different. Not only did AI fail to discriminate but also EI, in that the non-chance difference for EI was inverse with a lower mean corresponding to the more successful group. The results for both activity indices indicated that, for the veterans, those who were rated successful by reputation 15-17 years beyond gradution were those who were most actively involved in non-classroom activities in high school. All kinds of speculation is possible from such a finding, but the number of veterans rated successful was small ($N = 87$), and it is possible that in choosing the sample the judges recalled best those they remembered best, in which case those most active in college (who were probably active in high school) stood out.

Summary

Attainment of an Advanced Degree as a Criterion of Success

The attainment of an advanced degree was chosen as another criterion of success for students in colleges such as Brown. The major part of the study was concerned with Classes 1950-1952, but limited examinations were made of Classes 1966-1968 with a modified criterion of having entered graduate school, graduation of these classes from Brown being too recent to the writing of the report for more than a few of them actually to have attained an advanced degree.

The design fell into two parts: comparison of the relative success of ability groups within both the non-veterans and veterans; and examination of the discriminative properties of variables that could be available to an admission officer at the time of a student's application to Brown to a criterion beyond graduation from Brown, the focus being upon the verbal risk.

The proportion of non-veterans (.345) who attained at least one advanced degree was nearly twice the proportion of veterans (.188), although the proportions of graduates for each were closely similar, the mean graduation averages of each group were identical, and the veterans had achieved this coming from behind with significantly inferior pre-admission academic data. It would seem that the older veteran was highly motivated but immediately goal oriented insofar as graduation was concerned and that he settled for the security that went with its attainment.

In similar manner, the proportion of the higher verbal ability group of both non-veterans and veterans who attained an advanced degree was about twice the proportion in the verbal risks. In other words, attainment of an advanced degree was generally associated with the younger and the verbally more able. Of all non-veterans of the higher verbal ability group admitted to Classes 1950-1952, 43.5% attained at least one advanced degree, and of actual graduates of

Brown, a majority (51.3%) of the verbally more able (SATv over 500) attained such success. The finding implies that if attainment of advanced degrees is a desirable goal for students admitted to Brown, then higher selectivity and elimination of veterans would increase the numbers to attain such success. However, it is basic to this report that such a goal would be overly narrow, and the reader is referred to different findings when a criterion is considered several years beyond the completion of formal education.

Of all non-veterans who attained an advanced degree, 54.1% of those of higher verbal ability and 46.8% of the verbal risks were rated successful, the proportions being not significantly different. A similar finding was made for the veterans, the proportions for ability groups, also not significantly different, being 37.6% and 41.0% respectively. Similarly non-significant differences were found in the proportions who did not attain an advanced degree, although in a lower range of 11.8% to 19.2%, indicating that with or without an advanced degree, achieving a reputation for success several years later was about equally probable for members of either ability group.

When all verbal risks known to have attained an advanced degree were compared by traditional pre-admission data and also non-academic data, it was apparent that if such a criterion were an important goal for candidates for admission to Brown, an admission officer has an abundance of predictive information available to him. Only SATm of the traditional variables, SSR, SATv, SATm, HSAV and PSI failed consistently to discriminate. The results for the verbal risks of Classes 1966-1968 (criterion of entered graduate school) amounted to repetition. Of the variables, SSR, SATv, SATm, CBAT, and PSI, only SATm failed significantly to discriminate between those who entered and those who did not. The finding for 1966-1968 is interesting in that fewer academic variables were found to discriminate between graduates and non-graduates. Clearly, entering graduate school was most likely for those with a history from the secondary school through college of continuously high academic achievement and verbal aptitude. The admission officer would also be assisted in decision making by having available to him the non-academic variables, AI, the measure of counselor ratings of academic promise and motivation, EI, the index of the parent-home-school-community, and LAS, the measure of "doing" activities in high school. Higher AI and EI scores and lower LAS scores would be indicative of those likely to go on to graduate schools.

Reputation for Success as a Criterion of Success

A multi-dimensional model of success, more subjective and global than academic criteria, was developed for Classes 1950-1952. Such a criterion was impossible for Classes 1966-1968. Basically, it was reputation for success 15-17 years beyond the graduation of the classes or 19-21 years beyond their admission. Three sources determined the success groups: panels of outstanding fellow alumni rated them by seven criteria; others were added who had been included in certain well known national biographies such as Who's Who; and those who, by their biographies published in the Brown Alumni Monthly, also met the seven basic criteria. Those not rated successful were made the less successful group, not necessarily inferring that all lacked success, but that in not having come to the attention of the sources, they lacked reputation for success.

The design fell into two parts: comparison of the relative success of non-veterans and veterans and of their verbal ability groups several years beyond the graduation of Classes 1950-1952; and examination of the discriminative properties of pre-admission variables with respect to a criterion about 20 years beyond their immediate use. The indications of the variables, both academic and non-academic, would be suggestive of the worth of similar variables in the current admission process for an admission officer concerned with criteria of success beyond formal education.

Of the total samples, 29.2% of the non-veterans and 18.7% of the veterans achieved such reputation for success, the ratio of proportions for the groups being about 5:3, although nearly equal proportions had graduated from Brown. The non-veteran's advantage carried over into the ability groups with significantly higher proportions rated successful for both the higher and lower verbal ability groups. Between ability groups, the proportion was greater in the more able group for the non-veterans and not significantly different for the veterans. In other words, as for the attainment of an advanced degree, such success beyond graduation was apparently more likely for the younger and possibly more aspiring non-veteran, and of the non-veterans those who were verbally more able (as measured by SATv).

When the samples of graduates only were examined, the proportions of those rated successful within the higher and lower verbal ability groups, respectively 38.5% and 33.5% for the non-veterans and 21.0% and 25.2% for the veterans, were not significantly different. In other words, having graduated, the probability of a member of either verbal ability group achieving reputation for such success beyond graduation was about equal. Clearly, the key was to be graduated, and since closely similar proportions of the ability groups were graduated, the results of this analysis confirmed that a trend toward higher selectivity in a traditional variable such as SATv could be wasteful of human potential. The findings need to be examined in the context that higher verbal ability for the non-veterans amounted to SATv scores over 500, and over 480 for the veterans.

Of all non-veterans rated successful over the long-term, 73.2% of the verbal non-risks and 43.9% of the verbal risks compared respectively with 50.0% and 28.7% of the veterans, held an advanced degree. The proportions of both non-veterans and veterans who were rated successful and who also had an advanced degree significantly favored the higher verbal ability groups, implying that verbal risks entered work where such a degree was not so necessary or that their other qualities made for their getting along without one. Since the per cents of graduates who achieved the criterion were over 90% for the non-veterans and over 80% for the veterans, an advanced degree was seen to be less than graduation a component of such future success. Substantial proportions of those not rated successful also held advanced degree the range being 29.5% of the non-veteran of higher verbal ability to a low of 9.9% for the veteran verbal risks.

The discriminative properties of pre-admission variables in their relation to the criterion of reputation for success about 20 years later were also examined. The less academic nature of the criterion was evident not only in the generally lower means of academic variables than those for the groups with advanced degrees but also in their lack of discrimination. Rank in class (SSR), SATv, SATm, high school average (HSAV) and the local prediction (PSI) of GPA for the first semester in Brown, failed to separate those rated successful from those not rated in the veterans. The aptitude variables, SATv and SATm, failed to separate the groups of non-veterans, but academic achievement in high school and Brown's local prediction did separate them for the non-veterans, a group which contained 73.2% who attained an advanced degree.

The results for the non-academic variables also differed for the non-veterans and veterans, higher means of AI, the measure of ratings of promise, and EI, the Environmental Index, and lower involvement in athletic activities in the high school, being associated for the non-veterans with the more successful group. However, quite the reverse was found with non-significant discrimination for AI and EI and higher involvement in non-classroom activities typifying the more successful veteran.

CHAPTER IX

OCCUPATIONAL SUCCESS

Interest inventories have established themselves as useful instruments for vocational guidance. The consensus of research on the better known instruments, such as the Strong Vocational Interest Blank, is that they display substantial reliability and predictive validity of occupational choice. However, Mehrens and Lehmann (1969) note that interest inventories do not do very well in predicting job success, but they do not discount the fact that such a relationship may exist.

Since several success criteria were available, and since interest inventory scores were available for a substantial part of the population of the study, it was considered worthwhile to examine the predictive validity of such non-academic data in the sample of non-veteran verbal risks for whom the data were available.

Description of Interest Variables

It is important to note that data from interest inventories were not available to the admission officers at the time of admission of these classes, but were collected during the orientation of the entering freshman classes. An admission officer may wish to know how valuable they may be, and therein lies the relevance of the study.

Lee-Thorpe Occupational Interest Inventory (OII, 1943):

Scores were available for Classes 1951 and 1952 for the five variables; Personal-Social, Mechanical, Business, Arts, and Science fields of interest, and also Level of Interests.

Strong Vocational Interest Blank (SVIB, 1940):

Nine scores were available for the Class of 1950, those of Engineer, Physician, Mathematician, Minister, Certified Public Accountant (CPA), Lawyer, Personnel Manager, Office Manager, and Life Insurance Salesman (LIS). The scores were converted to standard scores using the means and sigmas found in the manual (SVIB Manual, 1940).

Description of Groups and Level

Data were obtained 15 to 17 years after the graduation of Classes 1950-1952 from alumni records which are continuously updated as information becomes available. To meet the needs of the study, an attempt was made to classify occupations in terms of success. Generally, as may be expected from a college population, occupations of Brown men were found to be more selective than those for men in general. The method of classifying occupations and levels within an occupation was to take the alumni classifications, to code them according to the Dictionary of Occupational Titles (DOT, 1965) and then to assign them to Roe's groups and levels (Roe, 1956, p. 151) which primarily focus upon the actual job and level of responsibility or skill involved. An example illustrates: if a lawyer actually functioned as a business executive then his occupation was classified as business and his level that of executive. Additional information available for those with data were job title, company name and address.

Groups

Three groups were defined: Science-Technology, General Culture-Service-Arts and Business Contact-Organization, afterward respectively called Science-Technology, General Culture and Business. Groups by occupations were:

Science-Technology	Architecture; Engineering; Life Sciences; Mathematics; Physical Sciences; Medicine and Health
General Culture	Arts; Education; Entertainment-Recreation; Law and Jurisprudence; Museum, Library and Archival Sciences; Religion and Theology; Social Sciences; Humanities; Social Welfare; and Writing

Business Administrative Specializations; Managers; Officials; and Sales Occupations

Levels

Three levels were logically determined within the groups from the job titles and occupations as they fitted the Roe criteria. Levels by criteria were:

High Level: Innovators; policy makers; those with no higher authority; when education was relevant, at the doctoral level

Middle Level: The distinction between Level 1 and this level was primarily one of responsibility

Low Level: The remainder; semi-professional; small business; skilled; semi-skilled; high school, equivalent, or less

Generally, when compared with men in general, both the middle and high levels should be considered successful. For the purpose of analysis each level was considered to be comparative across the three occupational groups.

Occupations by Group and Level

Distributions of verbal risks and verbal non-risks by occupational group and level are found in Table IX-1. Significantly more verbal non-risks than risks,

Table IX-1

Verbal Non-Risks and Risks by Occupational Group and Level, Classes 1950-1952

Occupational Group	Occupational Level											
	Verbal Non-Risks N = 574						Verbal Risks N = 495					
	High N = 91		Middle N = 360		Low N = 123		High N = 38		Middle N = 322		Low N = 135	
	N	%	N	%	N	%	N	%	N	%	N	%
Science-Technology	55	60.4	80	22.2	36	29.3	28	73.7	70	21.7	29	21.5
General Culture	26	28.6	106	29.4	10	8.1	8	21.0	56	17.4	7	5.2
Business	10	11.0	174	48.3	77	62.6	2	5.3	196	60.9	99	73.3

91 (15.8% of 574) compared with 38 (7.7% of 495), were classified as high level ($\chi^2 = 15.99$; d.f. = 1, $P < .01$). High level was most associated with the science group for both samples of risk and least associated with the business group. It has been noted that insufficient time may have elapsed for more than a few in the business field to have attained the high level as defined in this study. These findings confirm general findings concerning eminence in occupational fields. Counts within occupational groups for both types of risks are shown in Table IX-2.

Table IX-2

Verbal Risks and Non-Risks by Occupational Groups

Occupational Group	Verbal Non-Risks N = 574		Verbal Risks N = 495		χ^2#
	N	%	N	%	
Science-Technology	171	29.8	127	25.7	2.06
General Culture	142	24.7	71	14.3	17.36 **
Business	261	45.5	297	60.0	21.91 **

** $P < .01$
Overall $\chi^2 = 26.79$; d.f. = 2; $P < .01$: # d.f. = 1

Overall significance ($\chi^2 = 26.79$; d.f. = 2; $P < .01$) indicated that there was a relationship between verbal risk status at the time of admission to Brown and ultimate occupational choice. The proportions of higher and lower verbal ability groups who were found to be in Science-Technology 15-17 years after the graduation of Classes 1950-1952 were not significantly different. A significantly higher proportion of the General Culture occupations came from the verbally more able group and a significantly higher proportion of those in Business from those of lower verbal ability. A clear majority of the verbal risks (60.0%) ultimately chose Business related occupations compared with 45.5% of their peers who presented SATv scores in excess of 500 at the time of their admission to Brown.

Insofar as information was available concerning the post-graduate status of members of Classes 1966-1968, an examination was made to determine whether the finding for the old classes in regard to choice of Business held in the more selective situation of admission today. There were 804 verbal non-risks (SATv score > 619) in Classes 1966-1968. Of the 385 of them known to have entered graduate school and the 110 known to have entered employment, 72 (14.5%) are known to have chosen either a graduate school of business or business employment. There were 812 verbal risks (SATv score < 620) in Classes 1966-1968. Of the 298 known to have entered a graduate school and 160 into employment, 119 (26.0%) chose either a graduate school of business or entered business employment. On the basis of these figures, it would seem that significantly more verbal risks than non-risks of Classes 1966-1968 opted for Business ($\chi^2 = 19.33$; d.f. $= 1$; $P < .01$) like the verbal risks of Classes 1950-1952. However, such a finding needs to be accepted with reservation. The proportions cited for recent classes may be deceptive, since many, for example of those students now in law school, may be expected eventually to enter the business world. It is for this reason that a broader occupational study of recent classes was not warranted. The real value of the study of Classes 1950-1952 was that it was long-term, and alumni had arrived in their "true" occupations.

Results of analyses of verbal risks by occupational group and the success criteria, graduation, attainment of an advanced degree and reputation for success over the long-term are found in Table IX-3. The ratio of graduates to non-graduates within occupational groups, about 4:1, was found to be consistent, the pro-

4

Table IX-3

Analyses of Counts of Verbal Risks by Success Criterion and Occupational Group

Success Groups	Occupational Group						χ^2#
	Science-Technology N = 127		General Culture N = 71		Business N = 297		
	N	%	N	%	N	%	
Graduated	102	80.3	58	81.7	229	77.1	1.02
Not Graduated	25	19.7	13	18.3	68	22.9	
Advanced Degree Known	50	39.4	49	69.0	40	13.5	98.32 **
Advanced Degree Unknown	77	60.6	22	31.0	257	86.5	
Rated Successful	46	36.2	18	25.4	78	26.3	4.76
Not Rated Successful	81	63.8	53	74.6	219	73.7	
Graduated and Rated Successful	45	44.1##	16	27.6##	72	31.4##	6.36 *
Graduated and Not Rated Successful	57	55.9##	42	72.4##	157	68.6##	

* $P < .05$; ** $P < .01$
# d.f. = 2 for each contingency table
## Per cent of graduates only in each group

portions not being significantly different. The expectation that non-graduates would be found typically in business was not substantiated insofar as this sample of verbal risks was concerned.

Overall significance in the contingency table of counts in terms of those who attained advanced degrees confirmed expected differences between occupational groups. Of the Science-Technology group, over one-third (39.4%) of verbal risks are known to have attained such a degree. From the proportion in the Business group (13.5%), it may be inferred not only that the award of an advanced degree was less important for occupations within this group but also that such an award may be less meaningful for them as an index of success. Over two-thirds (69.0%) of those classified as General Culture by occupation had advanced degrees, suggesting that the probability of a student of lower verbal ability gaining such a degree may be most favorable in this domain.

Results found in Table IX-3 show lack of overall significance when the criterion was that of reputation for success 15-17 years beyond graduation from college, indicating that no occupational group was favored in the success ratings. Comparison of counts and their per cents for those who attained an advanced degree and those who were rated successful within occupational groups, indicated similarity of proportions only for the Science-Technology field. In other words, for both General Culture and Business, reputation for success was independent of the award of an advanced degree; for General Culture having such a degree clearly did not assure such a rating of success, and for Business not having such a degree was not necessarily an impediment to such a rating of success.

When the counts for those rated and not rated successful were reduced by eliminating the non-graduate, overall significance was found ($\chi^2 = 6.36$; d.f. = 2; $P < .05$), as may be seen from the final section of Table IX-3. Such a finding for the graduates within occupational groups confirmed an earlier finding that the probability of being rated successful favored the graduate.

Interest Inventory Scores as Predictors Of Occupational and Other Success

Since admission to college for many students is an integral part of their progress toward ultimate occupations, and since it has been shown that the occupational patterns of those of lower verbal ability accepted by Brown in the

Classes 1950-1952 in two of the three occupational areas were different from those of higher ability, there may be important implications for the admission process. The immediate question arises, of what value are interest inventory scores, and, in particular for this study, to what extent are they success predictors?

Interest Scores and Occupational Group

Interest scores may be expected to be related to long-term occupational choice. In Table IX-4 are found the results of one-way analyses of variance between occupational groups for each of the five OII variables and in Table IX-5 for the nine SVIB variables. The means within occupational groups for each vari-

Table IX-4

Analyses of Occupational Interest Inventory Variables by Occupational Groups

Interest Variable	Occupational Groups Ordered by Size of Mean						F
	Highest		Middle		Lowest		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Pers-Social	Gen Cult		Business		Sci-Tech		
	21.66	5.91	18.76	5.90	18.74	6.56	14.50 **
Mechanical	Sci-Tech		Business		Gen Cul		
	19.26	6.93	18.02	5.86	15.55	5.58	17.35 **
Business	Business		Gen Cult		Sci-Tech		
	23.79	8.10	22.86	7.83	18.76	7.60	30.52 **
Arts	Gen Cult		Business		Sci-Tech		
	22.64	7.16	20.15	7.35	17.82	6.87	21.40 **
Science	Sci-Tech		Business		Gen Cult		
	27.03	7.11	22.00	7.36	21.13	6.87	44.72 **

** P < .01
Business N = 417; General Culture N = 159; Science-Technology N = 230, for each analysis

Table IX-5

Analyses of Strong Vocational Interest Variables by Occupational Groups

Interest Variable	Occupational Groups Ordered by Size of Mean						F
	Highest		Middle		Lowest		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Engineer	Sci-Tech 37.80	12.93	Business 25.78	13.63	Gen Cult 24.44	12.08	22.38 **
Physician	Sci-Tech 34.28	13.51	Gen Cult 27.59	11.29	Business 24.30	11.03	16.31 **
Mathematician	Sci-Tech 38.68	10.12	Business 30.35	10.27	Gen Cult 29.43	11.39	16.89 **
Minister	Gen Cult 21.94	12.21	Sci-Tech 17.19	9.67	Business 15.85	11.22	5.89 **
CPA	Business 28.77	5.84	Sci-Tech 27.93	6.73	Gen Cult 25.98	5.95	4.02 *
Lawyer	Gen Cult 35.96	9.09	Business 32.40	9.84	Sci-Tech 29.26	10.10	7.02 **
Pers Mgr	Gen Cult 29.91	10.54	Business 29.01	10.88	Sci-Tech 26.09	10.47	2.32
Off Mgr	Business 36.23	7.98	Gen Cult 33.39	9.20	Sci-Tech 31.96	9.84	6.01 **
LIS	Business 35.21	10.69	Gen Cult 33.59	8.90	Sci-Tech 25.10	9.89	23.10 **

* $P < .05$; ** $P < .01$
Business N = 141; General Culture N = 54; Science-Technology N = 68, for each analysis

able in Table IX-4 are ordered from highest to lowest. Validity would be established in the highest mean clearly relating corresponding variable with occupational group and also a significant F-statistic demonstrating discrimination between the groups.

Clearly, even within the delimitations of this study, the occupational validity of OII and SVIB variables was strongly supported. A significant F-statistic was found for all OII variables and all SVIB variables except Personnel Manager, and a variable-occupation identity was clearly established for the highest means of all variables in both inventories. The Business group made the highest of the group means for the OII Business variable and CPA, Office Manager and Life Insurance Salesman of the SVIB variables. The General Culture group made the highest of the group means on the OII Personal-Social and Arts variables and Minister, Lawyer and Personnel Manager of the SVIB variables. Finally, the Scientific-Technological group made the highest of the group means of OII Mechanical and Science variables and Engineer, Physician and Mathematician of the SVIB variables. For the purpose of this study, the results also established validity of occupational groupings. The results imply that if "ultimate" occupation is or should be an important consideration of secondary school students applying for admission to colleges such as Brown, interest scores may have value in the process.

Interest Scores and Success

The chief concern of this study is success, and in particular the success of verbal risks. Do interest scores, which are deemed to measure strength of interest, have value for the prediction of success? What is the relationship between occupational choice and success?

The results of analyses of variance of interest scores by success criterion, occupational group and the inventory that they took at the time of admission are found in Table IX-6. Strength of interest was found within occupational groups generally not to separate graduates from non-graduates, those holding an advanced degree from those with no advanced degree, and those rated successful from those not so rated, except for the OII variables of Scientific and Mechani-

Table IX-6

Analyses of OII and SVIB Interest Inventory Scores
by Occupational Group and Success

Groups and Variables	Criterion of Graduation					Criterion of Advanced Degree					Criterion of Long-Term Success				
	Graduated		Not Graduated		F	Advanced Degree		No Advanced Degree		F	Rated Successful		Not Rated Successful		F
	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
Sci-Technology															
OII Sci	27.7	6.3	23.6	7.0	5.15 **	29.0	6.1	25.6	6.7	5.88 **	28.6	6.8	25.9	6.3	3.55
OII Mech	19.5	6.5	24.0	6.4	6.19 **	17.5	6.1	22.1	6.5	11.50 **	17.6	6.3	21.9	6.5	8.92 *
N	73		16			35		54			33		56		
SVIB Engin	38.7	12.5	37.0	14.8	0.11	38.3	12.1	38.3	13.7	0.00	35.0	10.6	40.0	13.9	1.23
SVIB Phys	32.6	13.8	25.4	14.7	1.71	36.1	14.3	27.5	13.3	3.39	34.9	10.3	28.8	15.7	1.52
SVIB Math	36.7	9.9	37.4	8.4	0.04	34.5	7.3	38.3	10.5	1.43	33.8	9.0	38.4	9.4	2.06
N	29		9			15		23			13		25		
Gen Culture															
OII Per-Soc	21.9	6.0	24.8	3.7	1.54	22.4	5.9	22.4	5.4	0.00	21.3	5.8	22.8	5.7	0.56
OII Arts	20.5	7.1	21.1	6.6	0.05	20.8	6.1	20.1	8.7	0.12	21.8	6.5	20.2	7.1	0.41
N	39		8			33		14			12		35		
SVIB Min	19.7	11.2	14.2	6.7	1.01	17.2	9.3	21.1	12.5	0.67	14.0	2.4	20.1	11.8	1.42
SVIB Lawyer	32.8	5.9	36.8	11.5	1.06	35.3	8.2	30.2	4.7	2.40	29.0	5.1	35.2	7.7	3.09
N	19		5			16		8			6		18		
Business															
OII Bus	24.5	8.1	24.3	7.5	0.01	24.3	6.7	24.5	8.2	0.01	23.9	7.1	24.7	8.3	0.43
N	157		47			28		176			58		146		
SVIB CPA	29.2	5.5	28.0	5.2	0.91	29.2	5.7	28.9	5.4	0.04	31.8	5.7	28.2	5.1	7.01 *
SVIB Per Mgr	27.6	11.1	29.4	11.6	0.40	27.6	11.8	28.1	11.1	0.02	29.4	9.8	27.6	11.5	0.42
SVIB Off Mgr	37.1	8.0	36.1	7.3	0.21	35.2	8.1	37.1	7.8	0.56	40.2	7.6	35.9	7.7	4.77
SVIB LIS	36.2	9.5	33.2	12.3	1.38	37.7	8.1	35.2	10.5	0.59	35.8	7.9	35.4	10.8	0.01
N	72		21			12		81			20		73		

* P < .05; ** P < .01

cal fields of interest for the Science-Technology occupational group. Otherwise, it would seem that interest inventory scores were not discriminators insofar as these criteria of success were concerned.

To examine the relationship between interest scores and the occupational level of verbal risks, it was necessary to combine levels within occupational groups. Even so, some of the cell counts were quite small. The results of analyses of variance of OII and SVIB interest scores of those deemed to have enjoyed a high, middle or low occupational level 15-17 years beyond the graduation of Classes 1950-1952 are found in Table IX-7. F-statistics for all SVIB variables fell short of significance, and only for the Science variable of the OII were the results decisive. For Business and for Arts, the highest level had the lowest mean, making meaningless the significant F-statistic. Generally, it is reasonable to conclude that scores deemed to measure strength of interest also did not discriminate between successful and less successful groups defined by the three occupational success levels.

Another variable, Level of Interests, was available as part of the OII. No comparable variable existed in the SVIB at that time. High scores for a subject indicated that his interests were like those of people whose work called for originality, extensive planning and professional skill, and a low score simple routine unskilled activities. OII Level of Interests scores were analyzed in terms of success groups by occupational groupings, and the results are shown in Table IX-8. The OII Level of Interests score did not significantly separate graduates from non-graduates, those known to have attained an advanced degree from those not known, and those rated successful over the long-term from those not so rated, for the occupational groups of General Culture and Business. However, this variable did discriminate within the Science-Technology group when the criteria were graduation and reputation for success, and though the F-statis-

Table IX-7

Analyses of Interest Scores of Verbal Risks by Occupational Level

Variable	Occupational Level						F
	High Level		Middle Level		Low Level		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
OII	N = 28		N = 221		N = 91		
Pers-Social	18.32	5.65	19.28	6.22	18.22	6.00	1.11
Mechanical	19.32	4.88	18.12	6.28	18.79	6.57	0.70
Business	18.96	7.60	22.78	7.91	23.59	8.42	3.58 *
Arts	15.21	5.91	19.61	7.15	19.29	6.89	4.89 **
Science	29.71	5.74	22.73	7.56	21.18	7.15	14.59 **
SVIB	N = 10		N = 101		N = 44		
Engineer	35.80	12.56	28.54	14.71	28.16	12.92	1.27
Physician	30.60	14.77	25.04	12.19	25.95	12.83	0.89
Mathematician	33.20	6.63	31.14	10.54	33.20	10.16	0.70
Minister	16.50	9.59	14.74	10.80	15.00	10.23	0.12
CPA	27.50	7.49	28.72	5.37	28.91	6.82	0.23
Lawyer	32.40	7.76	31.46	8.88	28.04	8.93	2.48
Pers Manager	28.50	15.58	27.26	10.74	27.61	11.37	0.06
Off Manager	33.00	10.59	35.92	8.44	36.45	8.16	0.66
LIS	29.70	9.68	32.60	10.68	33.27	11.16	0.44

* $P < .05$; ** $P < .01$

Table IX-8

Analyses of OII Level of Interests Scores of Risks
by Occupational Groups and Success,
Classes 1950-1952

Occupational Group	Success Criteria														
	Graduation				F	Advanced Degree				F	Reputation				F
	Graduate		Non-Graduate			Advanced Degree		No Advanced Degree			Rated Successful		Not Rated Successful		
	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
Science-Technology	74.81	8.25	67.44	6.70	10.91 **	75.34	6.77	72.28	9.22	2.80	76.06	7.68	71.96	8.56	5.01 *
N	73		16			35		54			33		56		
General Culture	72.07	8.94	72.25	7.10	0.00	73.39	8.58	69.07	8.07	2.47	72.08	8.68	72.11	8.65	0.00
N	39		8			33		14			12		35		
Business	73.87	8.66	71.19	8.27	3.50	75.00	7.60	72.97	8.77	1.33	74.00	9.30	72.95	8.35	0.61
N	157		47			28		176			58		146		

* P < .05; ** P < .01

tic fell short of significance for the criterion of attainment of an advanced degree, the highest mean corresponded to the more successful group.

Correlations between OII Level of Interests scores and pre-admission measures of academic success, GPA for the first semester in college, dichotomous success variables and occupational level (a trichotomy) are found in Table IX-9.

Table IX-9

Correlations Between Level of Interests Scores and Measures of Success

Variable	OII Level of Interest		
	Science-Technology	General Culture	Business
	N = 89	N = 47	N = 204
SSR	.24 *	.21	.10
HSAV	.34 *	.16	.02
PSI	.15	.11	.12
GPA	.25 *	.23	.00
Graduate/Non-Graduate#	.33 *	-.01	.13
Advance Degree/None#	.18	.23	.08
Rated Successful/Not#	.23 *	.00	.05
Occupational Level	.00	-.03	.05

* P < .05; # point-biserial correlations

Correlations significantly different from zero were found within the Science-Technology group but in no instance within the remaining groups. The results found in Tables IX-8 and IX-9 indicate for verbal risks that the OII Level of Interests score may be a discriminator between success groups but not occupational level as defined in this study. This finding in the non-cognitive domain is in line with the general finding in the cognitive domain where the predictions of mathematic-scientific achievement are generally more valid.

Pre-Admission Data as Predictors of Ultimate Occupational Group

It was a hypothesis of this study that the defined occupational groups would order themselves by traditional academic pre-admission data with a highest mean corresponding to Science-Technology and a lowest mean to Business. Again the sample was that of verbal risks only. The results of analysis of variance of both academic and non-academic data for non-veterans, Classes 1950-1952, are found in Table IX-10. The analyses were repeated for the verbal risks of Classes 1966-1968 insofar as information was available, the groups being all those known to be either employed or in graduate schools in Science-Technology, General Culture and Business. The results of analyses of variance of pre-admission data for these groups are also found in Table IX-10.

Classes 1950-1952

Significant discrimination between groups and a continuum of descending means corresponding to Science-Technology, General Culture and Business occupations were found for each of SSR, HSAV and PSI of the pre-admission academic variables and AI and EI of the non-academic variables. Overall significance was also found for SATm with the highest mean for Science-Technology, but a higher mean corresponded to Business than to General Culture. For SATv, descending means corresponding to occupational groups were found, but without overall significance reflecting the restricted nature of the variable which determined the risk dichotomy.

The results for AI in the non-academic variables imply that those in Science-Technology occupations were likely to have had higher ratings of academic promise and motivation and those in Business lower ratings at the time of their admission

Table IX-10

Results of Analyses of Pre-Admission Data and GPA of Verbal Risks by Occupational Group, Non-Veterans of Classes 1950-1952 and Classes 1966-1968

Variable	Non-Veterans, Classes 1950-1952						F	Classes 1966-1968						F
	Science-Technology N = 127		General Culture N = 71		Business N = 297			Science-Technology N = 141		General Culture N = 194		Business N = 119		
	Mean	S.D.	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	Mean	S.D.	
SSR^a	72.13	23.86	62.44	26.04	57.95	25.91	13.75 **	64.17	7.03	62.13	7.67	59.77	7.34	11.35 **
SATv	44.11	4.00	43.45	4.35	43.20	4.23	2.11	56.48	3.95	55.42	4.68	54.08	5.22	8.66 **
SATm	56.38	8.70	51.31	8.68	53.52	7.83	9.62 **	66.67	6.53	61.14	7.69	62.86	6.93	24.56 **
HSAV^b	2.92	0.66	2.66	0.71	2.50	0.64	18.50 **	59.93	5.75	56.96	5.20	56.28	6.32	16.12 **
PSI	2.23	0.41	2.02	0.41	1.96	0.43	19.16 **	2.24	0.36	2.14	0.31	2.03	0.34	11.86 **
AI	12.71	1.74	12.61	1.72	12.21	1.63	4.67 **	19.51	2.51	19.12	2.49	18.58	2.70	4.28 *
EI^a	4.06	1.61	3.25	1.57	3.11	1.45	17.69 **	49.94	9.51	49.65	10.77	47.28	9.62	2.70
EXC I^c	3.97	4.76	4.92	4.73	5.54	4.61	5.06 **	5.58	2.99	6.51	3.62	7.00	3.28	4.92 *
EXC II^d	3.35	2.94	4.20	3.55	3.80	3.40	1.61	5.00	3.49	4.81	3.66	4.98	3.84	0.11
GPA	2.20	0.70	1.96	0.64	1.84	0.62	13.49 **	2.41	0.55	2.21	0.55	2.06	0.55	13.04 **

* $P < .05$; ** $P < .01$
For Classes 1966-1968; a = Standard scores; b = CBAT; c = LAS; d = LOMAS; and for c, d, N (Sci) = 115, N (GC) = 156 and N (Bus) = 93

to Brown. A similar finding was found for EI, the index of environment. EXC I, the variable of athletically related activities, significantly discriminated between occupational groups but with a trend inverse to that found for academically related variables. The highest mean corresponded to Business and the lowest to Science-Technology, implying that those who eventually entered Business were more likely to be those who pursued more of such activities in high school, and those who entered Science-Technology participated less. The results for EXC II, the index of academically related activities in high school, were not decisive.

GPA for the first semester in college was also a significant discriminator between occupational groups ($F = 13.49$; $P < .01$), with a descending order of means like those of pre-admission academic variables. Results are found in Table IX-10, indicating a significant relationship between academic success in college and eventual occupational field.

Classes 1966-1968

The results of analyses of data for the verbal risks of Classes 1966-1968 amounted, except for EI, to repetition of the results for the sample of the old classes. For rank in class (SSR), the average of College Board achievement tests (CBAT), the local prediction for GPA for the first semester (PSI) and for verbal aptitude (SATv) this time with overall significance, the highest means corresponded to Science-Technology and the lowest means to Business. Overall significance was again found for SATm with the highest mean for Science-Technology and a higher mean for Business than General Culture, but this time the difference between the lower SATm means significantly favored those in Business ($t = 2.07$; $P < .05$).

Of the non-academic variables, the results for AI repeated those for AI in the analyses of data for the old classes, implying that those who eventually enjoyed occupations in Science-Technology were likely to have been more highly recommended at the time of admission to Brown and those who eventually entered Business less recommended. Although a descending order of means corresponding to groups was found for EI, the Environmental Index, the results were without overall significance. Again, an athletically related variable discriminated between occupational groups with an inverse trend, implying that those who eventually opted for Science-Technology indicated less participation on the average in such activities in high school and those in Business greater participation. The results for LOMAS, an index of "joining" activities in high school, were without significance insofar as discrimination between occupational groups were concerned.

The groups were also significantly separated on GPA for the first semester in college ($F = 13.04$; $P < .01$) indicating that there was a relationship between academic success in college and type of occupation after college. This finding was also in agreement with that find for GPA in the analyses of the sample of the old classes.

Pre-Admission Data as Predictors of Occupational Level of Success

All members of like occupational levels were combined for examination of the relationship between traditional pre-admission data and occupational level of success. The results of analysis of variance of the data of all verbal risks deemed to have attained high, middle, and low levels of occupation are found in Table IX-11. Trends with highest means corresponding to the highest level and lowest mean to the lowest level were found for SSR, SATv, HSAV and PSI, and, also for SATm without overall significance. A similarly significant trend was found for AI of the non-academic variables indicating that those who were rated highest eventually achieved the highest level, and for EI. An inversely significant trend for EXC I indicated that those who achieved the highest occupational level were more likely to have pursued less athletic involvement in high school. The results for EXC II were not decisive.

Table IX-11

Analyses of Traditional Data by Occupational Level

Traditional Data	Occupational Level						F
	High Level N = 38		Middle Level N = 322		Low Level N = 135		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
SSR	73.58	26.49	62.56	25.15	58.25	27.27	5.26 **
SATv	45.34	3.30	43.48	4.09	42.90	4.53	5.09 **
SATm	56.45	7.68	53.81	8.35	53.55	8.38	1.91
HSAV	3.03	0.66	2.62	0.67	2.53	0.69	8.29 **
PSI	2.27	0.38	2.04	0.42	1.96	0.46	7.61 **
AI	13.12	1.70	12.35	1.72	12.30	1.54	3.90 *
EI	3.97	1.53	3.39	1.54	3.15	1.57	4.28 *
EXC I	4.05	5.08	4.81	4.54	5.90	4.88	3.52 *
EXC II	2.95	2.50	3.92	3.49	3.54	3.06	1.78
GPA	2.40	0.69	1.96	0.64	1.80	0.64	12.83 **

* P < .05; ** P < .01

GPA for the first semester in college discriminated significantly between the levels (F = 12.83; P < .01), the highest mean GPA corresponding to the highest level and the lowest to the low level. The results suggest that there was a relationship for Brown students between academic accomplishment and occupational level, as defined, 15-17 years beyond graduation. Such an analysis of recent classes was not possible due to lack of criterion.

Clearly, what interest inventory scores could not do for the prediction of occupational success was found in the traditional data at the time of admission and added to by the non-academic data such as proposed in this study. The results of interest inventories have value in the qualitative predictions of occupational groups, but strength of interest appears to have no relationship with occupational success. The finding of this analysis is that quantitative analyses of interest scores should be made with caution, when the criterion is other than occupational group prediction. The use of interest inventories in the admission process would seem to be very limited and for the amount of time that is needed for their taking and their interpretation, hardly justified. Such instruments would add little to the information already available in the traditional data and which can be supplemented with new data such as the non-academic variables proposed in this study.

Summary

All non-veteran verbal risks of Classes 1950-1952 for whom interest inventory data (OII or SVIB) were available were classified as three occupational groups, Science-Technology, General Culture and Business and also by three occupational levels, high, middle and low, on the basis of recorded occupational information 15 or more years beyond graduation. Criteria of "ultimate" occupational choice and success were thus established.

High occupational level was found to be most associated with the science group and least with business confirming that, once graduated, the scientist may achieve top-level positions quicker than those of the other two groups. Significantly more verbal risks of Classes 1950-1952 (60%) than verbal nonrisks (45%) ultimately chose a business related occupation. The results for the verbal risks of Classes 1966-1968 also indicated that significantly more verbal risks (26.2%) than non-risks (14.5%) either entered a graduate school of business of a business occupation. Comparison of proportions for the older and newer classes, however, would be deceiving. It is not unreasonable to hypothesize that ultimately similar proportions of Classes 1966-1968 will find themselves in business related occupations, for example many of those currently in law school.

For Classes 1950-1952 the ratio of graduates to non-graduates within the three occupational groups was consistently about 4:1, inferring that when the criterion for verbal risks was that of "ultimate" occupation, the hypothesis was untenable that non-graduates would lean toward business.

Attainment of an advanced degree was found significantly to be more related to the Science-Technology (39.4%) and General Culture (69.0%) groups than to Business (13.5%). However, proportionately twice as many of the Business group who attained advanced degrees achieved a rating of success over the long-term, compared with much less than one-half in the General Culture group and about an equal proportion of those in Scientific-Technology. The results suggest that for the scientists award of an advanced degree and long-term success went hand in hand; that for verbal risks the probability of gaining an advanced degree was best in occupations of General Culture but that gaining a reputation for success for this group did not necessarily go hand in hand with attainment of an advanced degree; and for Business gaining an advanced degree not only was least important but that reputation for success may be independent of such attainment. For all groups, the probability of being rated successful over the long-term favored the graduate.

The validity of interest inventory scores to predict wide occupational groups was once again verified. Not only did a significant F-statistic arise from the one-way analyses of variance of all five OII variables (Personal-Social, Mechanical, Business, Arts and Science) and eight of the nine SVIB variables (Engineer, Physician, Mathematician, Minister, CPA, Lawyer, Office Manager and Life Insurance Salesman) but also the highest means for each variable were logically related to the occupation of the group. The results imply that if ultimate occupation is or should be an important consideration when students are applying for admission to college, interest inventory scores such as those of the OII and SVIB may have value in the admission process.

Within occupational groups of a verbal risk population, however, interest inventory scores were found to have little value as predictors of graduation, or advanced degree, considered for many to be important stages toward ultimate occupational choice and success. In general, interest inventory scores also failed to discriminate between those rated in the study as successful over the long-term and those not so rated, nor did they discriminate between the three defined levels of occupational success. Interest scores, deemed to be indicative of strength of interest in occupations, would appear, insofar as the sample of this study was concerned, not to have been discriminators with respect to the success criteria of the study. Some evidence was found that success within the science-technology field was predictable by the OII variables. This finding in the non-cognitive domain is in line with the general finding in the cognitive domain where predictions of mathematic-scientific achievement are also generally more valid.

Similar analyses to those of occupational group and level using interest inventory scores were made using academic and non-academic pre-admission data. All traditional academic variables for the verbal risk sample of Classes 1966-1968 and all but SATv for the verbal risk sample of Classes 1950-1952 significantly discriminated between the three occupational groups. For rank in class

(SSR), the aptitude variables SATv and SATm, the high school average (HSAV) or the average of College Board achievement tests (CBAT) and for Brown's local prediction of GPA for the first semester in college (PSI), the data of the three occupational groups were in the form of continua with the highest means corresponding to Science-Technology and the lowest to Business. Of the four non-academic variables, three were significant discriminators for the verbal risk sample of Classes 1950-1952 and two for the sample of Classes 1966-1968. AI, the measure derived from ratings of academic promise, significantly discriminated between occupational groups, with a trend of means similar to that of the academic variables. A similar trend was found for the environmental measure, EI, significant for Classes 1950-1952 but without significance in the data of Classes 1966-1968. An inverse trend, also with overall significance, was found for EXC I (or LAS) inferring that those who eventually found themselves in Science-Technology were less athletically involved in the secondary school and those in Business more involved. The results for a scholastically related variable, EXC II or LOMAS, were not decisive.

An analysis in terms of occupational success was possible only for the sample of Classes 1950-1952. Again, not only did the traditional academic data of class rank, verbal ability, high school average and prediction of GPA for the first semester in Brown, significantly discriminate between three occupational levels but also with trends of descending means corresponding to levels. Although SATm lacked overall significance, the descending means were also found. Of the non-academic variables, only EXC II, the measure of scholastically related activities in the secondary school, failed significantly to discriminate between levels. AI and EI acted like the academic variables with descending means corresponding to the levels high-middle-low. The inverse trend of EXC I implied that those who would eventually rate high level would be those least involved in secondary school activities and those rated low level, those most involved.

The implication of the findings is that if ultimate occupational choice and success is an important consideration in the selection of candidates for admission to colleges such as Brown, the use of interest inventory scores in the admission process to help define potentially successful risks would appear to be very limited. The possibility of dual prediction would appear to exist, that of occupational grouping through interest scores and degree of success through academic and non-academic data, but until a consensus has been established that the predictions from inventories are more valuable than the specifically stated preferences of individuals, the enormous task of administering and interpreting thousands of records hardly seems justified for the minimum usefulness found for them in this study. This recommendation is not intended to subtract from the worth of these instruments in vocational and personal counseling, nor does it amount to a recommendation that they should never be given to students. The focus of this study was to examine the success of risks and to recommend new instruments or measures which would assist the admission officer in his choice of risks with potential for success. The finding is that interest inventory scores fall short of other measures predictive of such success, and they are not recommended as admission data.

CHAPTER X

A MISCELLANY OF OTHER RISKS

The major portion of the report has been concerned with a risk defined by a cutoff on SATv. For any definition of risk there will always be exceptions; no category can be all inclusive. Perhaps the true risk is the dropout, but the admission officer lacks such foresight. The definition thus far has coincided with counselor and student opinion that candidates for admission with low SATv scores have a poor chance of acceptance, but it is only one of many possible definitions. This report would not be complete without consideration of some of them, defined by multiple criteria. Three types were considered: underachievers and overachievers defined by College Board scores; those who present imbalanced scholastic aptitude scores, where either SATv or SATm was heavily in excess of the other; and, moving away from standard scores, risks intuitively defined by an admission officer on the basis of his experience. This chapter is divided into three parts to consider each.

Part I: Underachievers and Overachievers

The concept of underachievement is not entirely accepted among researchers, probably due to its history of poor definition or because suitable measures for estimating underachievement and overachievement have not always been available or used. The definitions of Davis that underachievement and overachievement are the situations which exist when, relative to the average of his group, a student achieves respectively better on a test of aptitude than on a test of achievement and better on a test of achievement than on a test of aptitude, were accepted for this study (Davis; 1964, p. 260). The method of Davis uses comparable and standard measures and derives a difference score that is large enough to be significant at a designated level of probability. College Board scores are standard scores available to an admission officer, independent of the secondary school record. The method of this study was that of declaring samples of underachievers and overachievers on the basis of the aptitude variables, SATv and SATm, and the average of College Board academic achievement tests (CBAT). Thus, use was made of the classical tests for admission purposes, definitions by way of which would be meaningful to admission officers. The samples were from Classes 1966-1968 and the Class of 1969, the results of which would be relevant for current admission purposes.

A regression equation to predict CBAT scores from SATv and SATm scores was derived from the data of the total sample of Classes 1966-1968 (N = 1616):

$$CBAT' = .389\ (SATv) + .429\ (SATm) + 8.856$$

Multiple R^2 was .59, and the relative contributions to the total variance of the aptitude variables were 27% for SATv and 32% for SATm. A standard error of estimate of 4.37 was calculated, and one standard error of estimate was accepted as the critical difference between actual and predicted CBAT scores to define underachievement and overachievement. The sample of underachievers (N = 246) and overachievers (N = 247) from the total sample of 1616 members were compared by way of one-way analyses of variance of traditional pre-admission variables (including those which defined them), the non-academic variables, PSI, and GPA for the first semester in college. The results are found in Table X-1. The same regression equation was used to derive CBAT' scores for the Class of 1969, from which 76 underachievers and 141 overachievers were declared. Univariate statistics from analyses of their basic data are also found in Table X-1. Clearly, the two groups were validly defined, the difference between the means of their CBAT scores being over 130 points in a three-digit standard scale. There were no ability differences between groups. The

Table X-1

Analyses of Pre-Admission Data and GPA for Underachievers and Overachievers of Classes 1966-1968 and the Class of 1969

Variable	Classes 1966-1968					Class of 1969				
	Underachievers N = 246		Overachievers N = 247		F	Underachievers N = 76		Overachievers N = 141		F
	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
SSR	62.05	7.25	65.39	7.40	25.51 **	63.09	7.01	66.50	7.80	9.99 **
SATv	60.73	7.22	60.48	7.82	0.14	62.01	6.50	62.06	6.56	0.00
SATm	64.99	7.02	65.00	8.76	.01	67.76	6.25	66.33	8.99	1.52
CBAT	53.69	5.35	67.02	5.79	753.07 **	55.33	4.40	68.46	4.90	377.35 **
AI	18.90	2.73	20.30	2.56	34.40 **	19.79	2.95	21.06	2.20	12.68 **
EI	48.25	9.94	50.46	9.86	6.11 *	49.06	9.64	51.10	9.49	2.22
LAS#	6.61	3.38	5.23	2.97	16.65 **	6.39	3.20	5.43	3.20	2.97
LOMAS#	5.49	4.45	5.08	3.34	0.97	5.08	3.58	5.86	3.78	1.47
PSI##	1.96	0.32	2.64	0.36	503.99 **	2.08	0.28	2.75	0.35	209.61 **
GPA	2.05	0.56	2.54	0.67	75.51 **	2.15	0.62	2.57	0.68	20.15 **

* $P < .05$; ** $P < .01$

Respondents only: (1966-1968: Underachievers = 174, Overachievers = 182); (1969: Underachievers = 51, Overachievers = 99)

PSI is a function of SSR and CBAT which defined the samples.

results for rank in class (SSR) were expectedly in line with those for CBAT. The description of the samples for the Class of 1969 show that underachievers and overachievers of an incoming class may be declared on the basis of an equation derived from the three preceding classes.

The significant results for AI, the measure of counselor ratings of academic promise and motivation, in both analyses indicating that underachievers were rated lower,further supported the validity of this variable. Although the results fell short of significance for EI in the analysis of the data of the Class of 1969, higher EI means for the overachievers of both samples confirmed a general finding that overachievement is more likely to be associated with environments conducive to academic success, supporting the validity of the variable EI. Once again, the group of lesser accomplishment, in this case the underachievers, were those who were more involved in athletic and related activities in high school, as may be seen from the significant results for LAS for Classes 1966-1968 and the larger, but not significantly larger mean for the sample of the Class of 1969. The results for LOMAS, the index of "joining" activities were not decisive insofar as underachievers and overachievers were concerned.

Success in College -
GPA for the First Semester

One of the most important examinations that could be made of samples of underachievers and overachievers is the determination of the pattern of their achievement in college. Do underachievers continue to be underachievers, and overachievers continue to be overachievers? The results for academic achievement measured by GPA at the end of the first semester are found in Table X-1. Means for the underachievers (2.05) and the overachievers (2.54) of Classes 1966-1968 were significantly different. Further, when these means were compared with the statistic for the total sample (Mean GPA = 2.31; S.D. = 0.67; N = 1616), the probability that an underachiever would have a GPA for the first semester as high as the mean for all students and an overachiever would have a GPA as low as the mean for all students was for both about one in three. The similar results found in Table X-1 for the samples of the Class of 1969 show not only that the overachievers were significantly superior to the underachievers in GPA for the first semester but also when compared with the class mean (Mean GPA = 2.43; S.D. = 0.67; N = 680) that the mean of the underachievers (2.15) was substantially less and that of the overachievers (2.57) substantially greater. It would seem that underachievers and overachievers as defined were in fact underachievers and overachievers when compared with the typical performance of peers insofar as GPA for the first semester in college was concerned.

Success in College - Graduation

The argument that GPA at the end of the first semester in college was too soon after high school to judge the samples, who may have needed more time in the new academic environment to modify their behavior, called for a second analysis. The criterion was shifted to that of graduation to determine if the proportions of graduates in the samples differed from each other, the underachievers having less of them and the overachievers more of them, and if the proportions were significantly more or less than the proportion in the remainder, those with balanced achievement. The chi square statistic was used to test the significance of the differences in proportions, in all cases with one degree of freedom.

Of Classes 1966-1968, significantly fewer underachievers (74.4%) than balanced achievers (82.2%) graduated ($\chi^2 = 7.42$; $P < .01$), as did significantly more overachievers (88.3%) than balanced achievers ($\chi^2 = 4.93$; $P < .05$).

Clearly, the proportion of graduates in overachievers was significantly higher than in underachievers ($\chi^2 = 14.72$; $P < .01$). A less decisive analysis of the samples for the Class of 1969 was due to the recency of the graduation of the class to the time of writing (21 were for miscellaneous reasons delayed in their graduation). Although not significantly different, the proportions of graduates in the reduced samples of underachievers (81.4%) and overachievers (86.5%), supported the implication of the findings for the samples of Classes 1966-1968 that underachievers continued to be underachievers and overachievers to be overachievers when they went onto college from high school.

The next step in the design was to examine the data of graduates and non-graduates within the underachievers and overachievers for variables that may discriminate between success groups and which may be helpful in decision making at the time of the application of such candidates. Univariate one-way analyses of variance of the traditional and non-traditional pre-admission data of graduates and non-graduate underachievers and overachievers revealed total lack of discrimination in the traditional academic variables, SSR, SATv, SATm, and CBAT, and also the non-academic variables, AI, EI, LAS and LOMAS, for both sets of data for Classes 1966-1968 and for the Class of 1969. Even PSI, the local prediction of GPA for the first semester, did not discriminate. Yet, by the end of the first semester in college, the eventual graduates and non-graduates had separated themselves on GPA, as may be seen in Table X-2.

In other words, insofar as samples of underachievers and overachievers of Classes 1966-1968 were concerned, although by the end of the first semester academic achievement separated those who would be graduates from those who would not graduate, an admission officer would not have been helped in his selection of potentially successful candidates from the prediction of such achievement (as measured by PSI), from ability differences (as measured from SATv and SATm),

Table X-2

Results from Analysis of Variance of First Semester GPA for Graduates and Non-Graduates

Groups	Classes 1966-1968						F
	Graduates			Non-Graduates			
	Mean	S.D.	N	Mean	S.D.	N	
Underachievers	2.16	0.51	183	1.76	0.62	63	26.01 **
Overachievers	2.60	0.64	218	2.06	0.72	29	17.95 **
	Class of 1969						
Underachievers	2.22	0.52	57	1.97	0.72	13	2.07
Overachievers	2.67	0.60	109	2.15	0.91	17	9.29 **

** P < .01

from past academic achievement (as measured by SSR or CBAT), nor would the ratings of his counselors (as measured by AI), consideration of environment (as measured by EI), or the extent of participation in non-classroom activities, have helped. Clearly, some underachievers were successful and some overachievers fell by the wayside, but leads to recognizing who each would be were not apparent in the data used to admit them, or in the proposed non-academic variables.

The recommendation of this study is that if underachievers are acceptable candidates for admission, the key may lie in their identification so that they may be given very early guidance. The changes which take place in their behavior may well be a function of personality, and early encouragement and situational discussions may well be productive for them. Insofar as the overachievers are concerned, not only would they appear not to be risks but their self-sufficiency would seem to make them academically competitive, or even superior, when compared with their peers in general.

Degree Intention and Outcome

The criterion of graduation was modified to take into account degree election and outcome. The summary in terms of groups is found in Table X-3. It is seen that the proportions for Classes 1966-1968 so closely resembled corresponding proportions for the Class of 1969 as to amount to repetition.

Significantly more underachievers (83.0%) than balanced achievers (75.2%) elected the AB program ($\chi^2 = 6.36$; $P < .05$), compared with a closely similar proportion of overachievers (73.7%) for the samples of Classes 1966-1968. The results for the Class of 1969 were similar but with significantly fewer overachievers electing the AB program. Clearly, significantly more of the overachievers (26.3%) than underachievers (17.0%) opted for one of the ScB programs in the samples of Classes 1966-1968 and the proportions of the samples of the Class of 1969, respectively 30.2% versus 12.8%, were even farther apart.

The most important findings relate to ScB intention, specifically for overachievers who graduated in the majority for both Classes 1966-1968 (37 = 56.9% of 65) and the Class of 1969 (22 = 57.9% of 38). The proportions were significantly higher than corresponding proportions of those who elected this degree in either the underachievers or those of balanced achievement. The reader may question whether these were meaningful comparisons, and he is referred to a similar analysis of those who presented excessively higher SATm scores than SATv scores at the time of admission, in the subsequent part of this chapter. The significance of the finding lies in part in examining the basic data of overachievers in Table X-1. Means of SATv and SATm were below

Table X-3

Summary of Underachieving and Overachieving Groups and the Group of Balanced Achievement in Terms of Degree Intentions and Final Outcome

Degree Status at Time of Graduation	Classes 1966-1968											
	Underachievers N = 246				Overachievers N = 247				Balanced Achievement N = 1123			
	AB Intention		ScB Intention		AB Intention		ScB Intention		AB Intention		ScB Intention	
	N	%	N	%	N	%	N	%	N	%	N	%
Consistent	148	60.2	17	6.9	159	64.6	37	15.0	693	61.7	107	9.5
Inconsistent	1	0.4	17	6.9	3	1.2	19	7.7	8	0.7	115	10.2
Not Graduated	55	22.4	8	3.2	20	8.1	9	3.6	143	12.7	57	5.1
Totals	204	83.0	42	17.0	182	73.7	65	26.3	844	75.2	279	24.8
	Class of 1969											
	N = 70				N = 126				N = 395			
Consistent	50	71.4	1	1.4	73	52.9	22	17.5	271	68.6	35	8.9
Inconsistent	1	1.4	5	7.1	2	1.6	12	9.5	6	1.5	31	7.8
Not Graduated	10	14.3	3	4.3	13	10.3	4	3.2	40	10.1	12	3.0
Totals	61	87.1	9	12.8	88	69.8	38	30.2	317	80.3	78	19.7

the class means found in Table III-2. It would seem that success in an ScB program at Brown is less a function of ability as it is a function of past achievement and the qualities that make for it.

Post-Graduate Status

The final examination, of post-graduate status, was only possible for the samples of Classes 1966-1968, graduation of the Class of 1969 having been too recent to the study for substantial data collection. Four groups were defined, those who went to graduate schools, those who entered national service such as the military or Peace Corps, those employed, and those unknown. The distributions of underachievers and overachievers in Table X-4 were found to be different ($\chi^2 = 16.01$; d.f. = 3; $P < .01$), the proportion of those unknown being significantly higher for the underachievers and the proportion who went to

Table X-4

Post-Graduate Classification of Underachievers and Overachievers by Post-Graduate Status

Post-Graduate Status	Underachievers N = 246		Overachievers N = 247		χ^2#
	N	%	N	%	
Status Unknown	59	24.0	38	15.4	5.24 *
Military Service or Other Services	64	26.0	48	19.4	2.68
Employment	40	16.3	35	14.2	0.27
Entered Graduate Schools	83	33.7	126	51.0	14.36 **

* $P < .05$; ** $P < .01$
# d.f. = 1
Overall $\chi^2 = 16.01$; d.f. = 3; $P < .01$

graduate schools higher for the overachievers. The proportions in national service and employment were not statistically different. Further, significantly more overachievers (51.0%) than balanced achievers (42.6%) went on to graduate schools ($\chi^2 = 6.02$; d.f. = 1; $P < .05$), as did significantly fewer underachievers (33.7%) than balanced achievers ($\chi^2 = 5.65$; d.f. = 1; $P < .05$). If going on to graduate school is a desirable goal of students admitted to a college such as Brown, then acceptance of those defined as overachievers may be more desirable.

Part 2: Groups with Imbalanced Scholastic Aptitude Scores

It is not unusual for students to present imbalanced scholastic aptitude scores at the time of application, either the SATv score or the SATm score being considerably larger than the other. Are they risks and which are riskier? To what extent does such imbalance become a function of choice of either the AB or ScB degree? This study was made at the wish of the Director of Admissions.

The formulas SATm - SATv + 50 and SATv - SATm + 50 were applied to the data of the total sample of Classes 1966-1968 (N = 1616) to derive difference scores which were normally distributed with means of 54.44 (S.D. = 8.00) and 45.56 (S.D. = 8.00) respectively. The characteristic that males usually have SATm scores in excess of SATv scores was taken into consideration in the design. Imbalanced scores were defined at a critical point, equal in each case to the mean of the difference scores plus or minus one standard deviation. The procedure was repeated to derive difference scores for the Class of 1969, but the samples were defined at the same critical points as those for Classes 1966-1968 to make for a real-life application. The remainders of total samples were considered to be samples with balanced scholastic aptitude scores.

Univariate statistics and the results of F-tests from analyses of basic data of the samples with SATm in excess (Classes 1966-1968: N = 252, Class of 1969: N = 126) and samples with SATv in excess (Classes 1966-1968: N = 254, Class of 1969: N = 97) are found in Table X-5. Clearly, the samples were validly chosen, those with SATm in excess having mean SATm scores about 165 points on a three-digit scale in excess of SATv means and those with SATv in excess having mean SATv scores about 80 points in excess of SATm means. The enormous ability differences that were built into the design are seen from the F-statistics for SATv and SATm. The samples, however, were equated on academic achievement as measured by rank in class (SSR), the local prediction of GPA (PSI) and the College Board achievement test average (CBAT) for the samples of Classes 1966-1968. From the results of analyses found in Table X-5 it is reasonable to state that such samples may be declared for the purpose of current admission on the basis of data derived from the three preceding classes.

LAS, the athletically related non-academic variable, discriminated between those with SATm in excess and those with SATv in excess. The results found in Table X-5 imply that greater involvement in such activities in high school was likely to be associated with lower verbal ability. On the other hand, LOMAS, the measure of "joining" activities was a non-discriminator. AI, the measure of counselor ratings of academic promise and motivation, also was a non-discriminator between groups, which not only confirmed that neither group was favored in the ratings of the high school counselors but also that AI was appreciably independent of ability, an intention in its construction. Lastly, a significant difference between means of EI for the samples of the Class of 1969 but not for the samples of Classes 1966-1968 made indecisive a finding with respect to a relationship between such groups and environment as measured by EI.

Success in College - GPA for the First Semester

The results for GPA for the first semester in college found in Table X-5

Table X-5

Analyses of Pre-Admission Data and GPA for the First Semester for Groups with Imbalanced Board Scores, Classes 1966-1968 and Class of 1969

Variable	Classes 1966-1968					Class of 1969				
	SATm in Excess N = 252		SATv in Excess N = 254		F	SATm in Excess N = 126		SATv in Excess N = 97		F
	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	
SSR	63.58	7.35	62.82	7.91	1.24	64.35	8.35	64.10	7.67	0.05
SATv	54.12	5.92	66.35	6.04	526.91 **	55.69	5.19	66.94	5.55	240.08 **
SATm	70.82	5.52	58.30	7.04	493.27 **	72.33	4.26	57.96	6.50	392.41 **
CBAT	60.90	6.28	59.97	6.68	2.61	63.04	6.00	61.45	5.56	4.04 *
AI	19.67	2.68	19.28	2.60	2.82	20.40	2.54	20.90	2.10	2.37
EI	47.88	10.16	49.66	10.64	3.71	48.72	9.37	51.82	10.11	5.56 *
LAS #	6.18	3.37	5.29	3.22	6.44 *	7.31	3.34	5.37	2.75	14.55 **
LOMAS #	4.89	3.58	5.17	4.16	0.46	5.51	3.87	6.15	4.85	0.82
PSI	2.29	0.39	2.29	0.39	0.03	2.43	0.39	2.39	0.34	0.86
GPA	2.22	0.66	2.39	0.68	7.61 **	2.27	0.66	2.50	0.59	7.24 **

* $P < .05$; ** $P < .01$

# Respondents only: (SATm in Excess: N = 189 and SATv in Excess: N = 167 for 1966-1968); (SATm in Excess: N = 90 and SATv in Excess: N = 65 for Class of 1969) favored those with SATv in excess in both analyses. However, such results could not be considered definitive needing to be related to curriculum for these special groups. However, the diversity of subjects for the first semester made such an analysis tenuous. When GPA for the first semester for those who elected the AB or ScB program was analyzed within the groups of those with SATm and SATv in excess, the results, reported in Table X-6, demonstrated lack of significance in the difference between means of GPA for degree groups. However, they do shed light upon those found for GPA in Table X-5. Clearly, the significantly lower GPA mean for those with SATm in excess was related to the large number of them

Table X-6

Results from Analysis of Variance of GPA
for the First Semester for Groups
Defined by Degree Intention

Groups	Classes 1966-1968								F
	AB Intention N = 392				ScB Intention N = 114				
	Mean GPA	S.D.	N	%	Mean GPA	S.D.	N	%	
SATm in Excess	2.17	0.63	157	40.1	2.31	0.70	95	83.3	2.40
SATv in Excess	2.41	0.66	235	59.9	2.14	0.75	19	16.7	2.85
	Class of 1969								
	N = 164				N = 33				
SATm in Excess	2.20	0.64	82	50.0	2.43	0.64	29	87.9	2.63
SATv in Excess	2.52	0.57	82	50.0	2.25	0.92	4	12.1	0.80

who elected an AB program. The mean GPA of those who elected the ScB program in both sets of results compared favorably with the means of total groups (Classes 1966-1968: Mean GPA = 2.31; S.D. = 0.67; N = 1616 and Class of 1969: Mean GPA = 2.43; S.D. = 0.67; N = 680). In other words, there was some evidence insofar as immediate academic success was concerned that those with SATm in excess achieved better if they chose an ScB program, and those with SATv in excess achieved better if they chose an AB program.

Success in College - Graduation

The differences between the proportions of 4-year graduates of those with balanced scores (82.1%) and those with SATm in excess (80.2%) and also those with SATv in excess (83.1%) were not significantly different for Classes 1966-1968. The difference between the proportions of the two groups with imbalanced SAT scores was also not significantly different. Similar non-significantly different proportions were found for the samples of the Class of 1969, the proportions of 4-year graduates being 84.6% of those with balanced scores, 83.7% of those with SATm in excess and 87.2% of those with SATv in excess.

It would seem from both analyses, Classes 1966-1968 and the Class of 1969, that the probability of graduation for a candidate accepted with SATm imbalanced in excess was not significantly different from the probability for those accepted with SATv in excess, and that neither of them appeared to be risky or favored when compared with peer groups with balanced scores.

Consistency of Degree Intention

Summaries of initial degree intention and outcome at the time of graduation for the two groups with imbalanced SAT scores and the group with balanced scores are found in Table X-7. Insofar as degree intention was concerned, the groups of Classes 1966-1968 with imbalanced scores differed significantly from each

Table X-7

Summary of Groups with Imbalanced and Balanced SAT Scores in Terms of Degree Intentions and Final Outcomes

Degree Status at Time of Graduation	Classes 1966-1968											
	SATm in Excess N = 252				SATv in Excess N = 254				Balanced SAT Scores N = 1110			
	AB Intention		ScB Intention		AB Intention		ScB Intention		AB Intention		ScB Intention	
	N	%	N	%	N	%	N	%	N	%	N	%
Consistent	125	49.6	40	15.9	196	77.2	3	1.2	679	61.2	118	10.6
Inconsistent	2	0.8	35	13.9	0	0.0	12	4.7	10	0.9	104	9.4
Not Graduated	30	11.9	20	7.9	39	15.4	4	1.6	149	13.4	50	4.5
Totals	157	62.3	95	37.7	235	92.5	19	7.5	838	75.5	272	24.5
	Class of 1969											
	N = 111				N = 86				N = 394			
Consistent	66	59.4	14	12.6	72	83.7	1	1.1	256	65.0	43	10.9
Inconsistent	5	4.5	8	7.2	0	0.0	2	2.3	4	1.0	38	9.6
Not Graduated	11	9.9	7	6.3	10	11.6	1	1.1	42	10.6	11	2.8
Totals	82	73.9	29	26.1	82	95.4	4	4.6	302	76.6	92	23.4

other ($\chi^2 = 64.46$; d.f. = 1; $P < .01$), a higher proportion of those with SATm in excess (37.7%) electing the ScB program compared with those with SATv in excess (7.5%). Similar results were found for the Class of 1969, when the two groups with imbalanced SAT scores were compared for degree intention. Significantly more of those with SATm in excess chose the ScB degree at admission ($\chi^2 = 14.52$; d.f. = 1; $P < .01$), as expected, but the proportion of them (26.1%) was less than the corresponding proportion for Classes 1966-1968.

Initial intentions and final outcome were also different within degrees and groups. A ratio of about 3:1 is observed in Table X-7 for those of Classes 1966-1968 with AB and with ScB intention in the group with balanced scores, compared with 2:1 in the group with SATm in excess, and over 12:1 in the group with SATv in excess. Corresponding ratios of those whose degree intentions were consistent through graduation were about 6:1, 3:1 and 60:1. A similar set of ratios were found for the Class of 1969 with about 3:1, 3:1 and 20:1 respectively for degree intention and 6:1, 5:1 and 70:1 with respect to outcome. Generally, only about 1% changed from AB to ScB, but substantial numbers of those who elected the ScB changed to an AB program.

The critical group was clearly those with SATm imbalanced in excess of SATv who were accepted for the ScB degree. It would be reasonable to hypothesize that such students would be favored in the sciences on the basis of their apparent superiority in mathematical aptitude, but from the results found in Table X-7 such a generalization cannot be made. For Classes 1966-1968, of the 95 with ScB intention, only 40 (42.1%) enjoyed success in the attainment of the desired degree, a proportion not significantly different from the 118 (43.4%) of the group of 272 with balanced SAT scores with the same degree intention. Similar proportions for the Class of 1969, 48.24% of those with SATm in excess and 46.74% of those with balanced scores, were also not significantly different. These findings need to be examined in the context that members of these groups on the average had SATm scores about 165 points on a three-digit scale in excess of SATv scores at the time of admission. Only 40 of the 252 in the accepted students of Classes 1966-1968 and 14 of 111 of the Class of 1969 attained the Bachelor of Science, implying that the probability of this attainment for such students was less than one in six. On the other hand, realism would seem to have prevailed for those with SATv in excess, since 77.2% of those of Classes 1966-1968 and 83.7% of those of the Class of 1969 who elected to pursue the AB degree actually graduated with the Bachelor of Arts.

Clearly, very much higher SATm scores were not of themselves sufficient to assure success in the ScB program. To what extent, then, was success a function of SATv or other variables? The pre-admission data of the three groups defined by those who completed the ScB degree (N = 40), those who transferred to the AB program (N = 35) and those who did not graduate (N = 20), all being subjects with SATm in excess, were examined by way of analysis of variance. Non-significant F-statistics were found for all academic variables (SSR, SATv, SATm and CBAT), for the non-academic variables (AI and EI) and PSI, the prediction of GPA for the first semester. A similar analyses was made for the Class of 1969 of those with SATm in excess who elected an ScB program, the counts being 14 who achieved the degree, eight who transferred to an AB program and seven who dropped out altogether. Again, non-significant differences were found between variables. Yet, the three groups of Classes 1966-1968 had separated themselves on GPA by the end of the first semester ($F = 15.14$; $P < .01$) with means of 2.64, 2.26 and 1.72 corresponding to the graduates, the degree transfers and the non-graduates. In view of the small size of samples the results for the Class of 1969 lacked significance, but the trend was similarly apparent with means of 2.70, 2.31 and 2.02 corresponding to the three groups.

In other words, staying with the original ScB intention, transferring to the AB program, or falling away from Brown altogether, was not a function of academic achievement in high school (as measured by SSR and CBAT) or of aptitude (as indicated by either SATv or SATm). Counselors rated members of the potential groups about equally (as measured by AI) and group membership was not a function of the home-school-community environment (as indicated by EI). Further, the members of the group would not have been predicted by PSI, a statistic based upon the past achievement at Brown of students with comparable data. The conclusion has to be that insofar as the group with SATm in excess who elected the ScB program are concerned, their futures were determined by their immediate academic success in college and that for many the academic program was too difficult.

Post-Graduate Status

An examination similar to that made with underachievers and overachievers was made of post-graduate status for the imbalanced groups, four sub-groups being again defined, those of status unknown, military or other service, employment, and entered graduate school. Results are summarized in Table X-8. Repetition of this portion of the study for the Class of 1969 was not possible, graduation of this class being so recent to the writing of this report.

Although overall significance was found, the main difference between groups lay in the numbers who entered employment immediately after graduation. Non-significant chi squares were determined for those whose status was unknown, who entered the military or other services, and who entered graduate schools. The proportion of those with SATm in excess who entered employment was more than twice that of those with SATv in excess.

Table X-8

Classification of Groups Defined by Imbalanced Boards and Post-Graduate Status

Post-Graduate Status	SATm in Excess N = 252		SATv in Excess N = 254		χ^2#
	N	%	N	%	
Status Unknown	52	20.6	56	22.0	0.08
Military or Other Service	46	18.3	60	23.6	1.89
Employment	60	23.8	26	10.3	15.57 **
Entered Graduate School	94	37.3	112	44.1	2.14

** $P < .01$
# d.f. = 1
Overall $\chi^2 = 17.00$; d.f. = 3; $P < .01$

Part 3: Intuitively Defined Risks

It became the practice for the Director of Admissions to choose a sample of risks for each class. The method for Classes 1967 and 1968 was that of subjectively examining the folders of each class after matriculation but prior to actual entrance and declaring about 10% as risks on the clinical basis of his experience as an admission officer. For the Class of 1966, which was already in residence when the study was first begun, he elected to declare a random sample from the lowest quintile on PSI, the local prediction of GPA for the first semester in college. When the traditional pre-admission data for the samples of risks of the separate classes were analyzed, the results of which are found in Table X-9, they were found not to be different on all variables except PSI which was used to define one of the groups. Comparison of

Table X-9

Univariate Statistics of Pre-Admission Data
and GPA for Intuitively Defined Risks,
Classes 1966, 1967 and 1968

Variable	Class of 1966 N = 64		Class of 1967 N = 55		Class of 1968 N = 64		F
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
SSR	55.12	8.15	56.58	8.60	58.39	7.13	2.66
SATv	53.50	5.60	52.20	7.46	53.75	8.08	0.78
SATm	58.22	6.91	57.24	7.44	60.31	7.82	2.68
CBAT	51.50	3.96	52.76	6.01	54.30	6.85	3.77
PSI	1.71	0.18	1.80	0.35	1.93	0.37	##
GPA	1.86	0.45	1.88	0.61	1.77	0.62	0.66

## Invalid, since the sample for Class of 1966 was defined on PSI.

the data for the groups with data for the classes as wholes, showed that the Director of Admission had chosen comparatively risky groups. He broadened his criteria in choosing the risks of the Class of 1969, and he also doubled the proportion of them. About one-half were similar to those chosen for previous classes, but the remainder had considerably higher credentials. Since the sample of the Class of 1969 was for cross-validating purposes, from the larger group were taken 71, one-tenth of the whole class, with lowest PSI, to be the sample of risks.

Although parametric studies of the samples of risks and their sub-groups were relevant to the study, an examination of the composition of such intuitively defined risks was considered to be even more important.

Success in College - GPA for the First Semester

By the end of the first semester the groups were living up to their appellation in terms of academic achievement, with a mean GPA of 1.83 (S.D. = 0.57; N = 183) for the risks of 1966-1968 and 1.83 (S.D. = 0.54; N = 71) for those of 1969, compared with 2.31 (S.D. = 0.67; N = 1616) and 2.43 (S.D. = 0.67; N = 680), the statistics for corresponding total samples. The Director of Admissions clearly had focussed upon risk students.

Success in College - Graduation

The recency of the graduation of these classes to the writing of this paper made for classification of three groups in terms of graduation, those who graduated within four years and considered to be the most successful group, those who dropped out of Brown altogether and considered to be the group of non-graduates, and a miscellaneous group who for sundry reasons were still registered and could not be considered either graduates in four years or non-graduates. Univariate statistics from analyses of variance of traditional pre-admission data of the three sub-groups, non-academic data, and GPA for the first semester are found in Table X-10 for both the risks of Classes 1966-1968 and the Class of 1969. The results for the latter class call for particular care in their interpretation not only for the size of the groups but also for the lack of homogeneity of variance in all data except GPA.

Of the 152 risks of Classes 1966-1968 for whom the criterion of graduation was clearly established 115 (75.6%) graduated, and this proportion was significantly less than the 1209 (82.6%) of the 1464 in the remainder of the total sample ($\chi^2 = 4.00$; d.f. = 1; $P < .05$). Graduation of three-quarters of such a group of risks was no mean accomplishment, especially when they are considered in terms of their pre-admission data. However, presumably they were accepted to be successful, and they were not as successful as the remainder of the class.

Of the 66 risks of the Class of 1969 for whom the criterion of graduation

Table X-10

Description of Intuitively Determined Risks in Terms of Their Status at the Time of Graduation

Variable	Classes 1966-1968 Original Risks (N = 183)						F	Class of 1969 Original Risks (N = 71)						F
	Graduated in 4 Yrs N = 115		Not-Graduated N = 37		Miscellaneous N = 31			Graduated in 4 Yrs N = 53		Not-Graduated N = 13		Miscellaneous N = 5		
	Mean	S.D.	Mean	S.D.	Mean	S.D.		Mean	S.D.	Mean	S.D.	Mean	S.D.	
SSR	58.01	8.20	54.49	7.05	54.52	7.65	4.16 *	57.26	6.56	57.00	5.62	61.00	2.00	0.84
SATv	52.80	7.23	53.78	7.96	53.97	5.53	0.48	55.75	5.67	54.38	7.09	58.00	4.98	0.67
SATm	58.46	7.79	59.68	6.97	58.16	6.93	0.44	63.32	5.26	58.23	8.04	63.20	6.52	3.70
CEEB Ach Av	52.62	6.14	52.68	5.91	53.97	4.30	0.67	54.98	3.52	54.46	5.62	57.20	2.64	0.86
AI#	18.04	2.70	16.17	3.31	16.43	2.84	4.90 *	18.64	3.00	19.08	3.15	21.20	2.32	1.63
EI	46.64	9.74	50.19	10.14	53.13	9.62	4.77 *	47.70	9.14	50.08	9.86	42.00	7.13	1.35
LAS##	7.35	3.81	7.56	3.81	7.14	3.92	8.18 **	8.31	3.04	5.50	2.59	6.75	4.59	3.44
LOMAS##	4.61	3.69	4.44	4.93	5.14	3.95	4.88 *	4.74	4.42	3.17	2.32	3.50	3.42	1.25
PSI	1.84	.34	1.75	.30	1.81	.28	0.89	1.94	0.16	1.93	.24	2.06	0.04	1.20
GPA	1.99	.56	1.46	.53	1.69	.41	15.58 **	1.98	0.45	1.40	0.58	1.37	0.46	9.85 **

Respondent Sample (1966-1968) Graduates = 112; Non-Graduates = 35; Miscellaneous = 30
Respondent Sample (1966-1968) Graduates = 93; Non-Graduates = 9; Miscellaneous = 21
Respondent Sample (1969) Graduates = 42; Non-Graduates = 6; Miscellaneous = 4

was clearly established 53 (80.3%) graduated, the proportion being not significantly different from the 509 (87.3%) of 583 in the remainder of the class. Although, the Director of Admissions would appear to have been more successful in his selection of risks for the Class of 1969 than he was for the Classes 1966-1968, the proportions of graduates for the risks for Classes 1966-1968 and for the Class of 1969 were not significantly different ($\chi^2 = 0.33$; d.f. = 1; $P > .05$).

The groups of graduates, non-graduates and miscellaneous of Classes 1966-1968 significantly separated themselves on GPA at the end of the first semester in college ($F = 15.58$; $P < .01$) and also for the Class of 1969 ($F = 9.85$; $P < .01$). Yet, it is also clear from Table X-10, that except for SSR for the samples of Classes 1966-1968, the traditional pre-admission data which was used only a few months previously to assist in the decisions of their acceptance lacked the power to discriminate between such groups. Even PSI, the prediction of such GPA, calculated on the basis of the previous success of students with similar data, was of little value to the admission officer. This is no phenomenon; it is reasonable to assume that academic variables would operate minimally in a group homogenously restricted and poor on academics.

On the other hand, the results found for the non-academic variables for the samples of Classes 1966-1968 suggest that had such information been available to an admission officer, these variables may have assisted him in the prediction of academic success of such risks. Once again the value of secondary school counselor ratings, as measured by AI, was demonstrated with the highest mean corresponding to that of the graduates. Environmental influences, as measured by EI, were particularly interesting in that the lowest mean corresponded to the graduates, and this result was inverse to the finding for the total sample. Since a lower EI score has been defined in terms of lower socio-economic status, this finding suggests that students with lower admission credentials were better risks if they were from less fortunate home-school-communities. Insofar as involvement in extra-curricular activities was concerned, as measured by LAS and LOMAS, the non-graduate risk appeared to have been more involved in athletics and less in culturally related activities. The results for the Class of 1969 were indecisive due to the size of groups.

Degree Intention and Outcome

Of the sample of Classes 1966-1968, 86.9% elected for the AB program at entrance compared with 93.0% of the sample of the Class of 1969. Only nine of the 24 risks of Classes 1966-1968 and one of seven of the risks of the Class of 1969 who began in the ScB program actually attained the Bachelor of Science. The results confirm not only that risks are less likely to be acceptable for heavily science programs but also have low probability of success in them. In other words, a policy of accepting risk students at Brown amounts to recruiting them for AB programs.

Post-Graduate Status

The four classifications of post-graduate status used in the report, status unknown, military or other national service, entered graduate school and employed, were determined for the intuitively defined risks. Of the 183 risks of Classes 1966-1968 their status had not been indicated by 52 (28.4%); 39 (21.3%) were in the military or other service; 51 (27.9%) were known to have entered graduate school; and 41 (22.4%) were employed. The proportions unknown or in one of the services did not differ appreciably from those for the total classes, (about 20%). It was in the proportions in graduate school and employed, respectively 42.3% and 16.7%, that the differences lay. Clearly, students classified at entrance as intuitively defined risks were less likely to continue into the graduate schools and more likely to enter employment. This analysis was not possible for the risks of the recently graduated Class of 1969.

Composition of Intuitively Defined Risks

An important examination was to determine the extent to which clinically defined on the basis of an admission officer's experience would be the same as those objectively defined. The reader should note that the Director of Admissions was never asked to identify the risks by type, for example as underachievers in high school, nor was he party to the statistical determinations of the several types, which, of necessity, post-dated by several years the admission of the students.

Over 90%, 165 (90.2%) of the 183, of the intuitively defined risks in Classes 1966-1968 would also have been defined as risks on the basis of the verbal risk dichotomy, had it been applied to these students at the time of their admission. The proportion for the Class of 1969, 60 (84.5%) of 71, was not significantly different ($\chi^2 = 1.11$; d.f. = 1; $P > .05$). It would seem that an admission officer intuitively subscribed to an identity of risk status with low SATv scores.

About one-third, 58 (31.7%) of the 183 risks of Classes 1966-1968 were underachievers as defined in this report. The parent sample from these classes comprised less than one-sixth, 246 (15.2%) of 1616. Thus, the proportion of underachievers in these risks was about twice as great as the proportion in a total class. Similar results were found for the Class of 1969. Of the 71 intuitively defined risks about one-third (29.6%) were also defined as underachievers. The proportions in each of Classes 1966-1968 and 1969 were not significantly different ($\chi^2 = 0.03$; d.f. = 1; $P > .05$). Either deliberately or intuitively, the Director of Admission identified risk status with the observation of underachievement. However, his identification of less than one-quarter of them fell far short of the members who would have been so defined using a controlled statistical design.

Less than one-tenth of the intuitive risks of Classes 1966-1968, 15 (8.2%) were also defined as overachievers in this report, compared with about one-sixth, 247 (15.3%) of 1616, in the parent sample. Similarly, for the Class of 1969, less than one-tenth, 4 (5.6%) of the 71 risks were also defined as overachievers, a very small proportion of the 141 (2.8%) in the parent sample for this class. Thus, the probability of an overachiever as defined being declared a risk was only about half the probability of his being accepted for Brown. It would seem that an admission officer was much less disposed to consider such candidates for admission as risks, an opinion, if he made it, that coincided with the non-risk nature of the findings that have been found in this report for the larger sample of all defined overachievers. Presumably, those who were chosen were either not recognized as overachievers, or their riskiness was determined on the basis of other considerations.

It was earlier noted that a study of those with imbalanced scholastic aptitude scores was made at the request of the Director of Admissions. About one-quarter, 44 (24.0%) of the 183 risks of Classes 1966-1968 had imbalance of SATm over SATv as defined in this study, about one-sixth, 32 (17.5%) had imbalance of SATv over SATm. Thus, about 42% of the risks defined in the admission office had imbalance of SAT scores of one form or another. It is seen from the corresponding per cents in the parent samples in the total sample of Classes 1966-1968, 15.6% with SATm in excess and 15.7% with SATv in excess, that the concern was for those whose SATm was in excess. There were significantly more of them proportionately in his chosen risks than in the remainder of the class ($\chi^2 = 11.18$; d.f. = 1; $P < .01$), whereas the proportions of those with SATv in excess were not significantly different. Of the intuitive risks of the Class of 1969, 21 (29.6%) of the 71 had SATm in excess, and 10 (14.1%) of the 71 had SATv in excess. About the same proportion as for Classes 1966-1968, 43.7%, had imbalance of SAT scores of one form or the other. The corresponding proportions for Classes 1966-1968 and for the Class of 1969 were not statistically different. The finding of this report is that candidates for admission with excess SATm over SATv scores, as defined, are risks from an admission officer's point of view. He is concerned with more than bringing in people to graduate; the survival of programs is often in his hands. To the extent that about 60% of this type of student do not attain what should be for them the immediate criterion for success, graduation with the degree of Bachelor of Science, they are risks.

Summary

Recognizing that risks defined by a single criterion, that of SATv, were but one of many kinds of risks, three other types, defined by multiple criteria, were examined for information concerning them of value to an admission officer. This was a byproduct study limited to Classes 1966-1968 and cross-validated on the Class of 1969.

Underachievers and overachievers defined from their College Board scholastic aptitude and achievement scores independent of their secondary school transcripts were found to be underachievers and overachievers in college with respect to the average of their peers. The defined overachievers of Classes 1966-1968 were not only superior in grade point average as early as the end of the first semester in college but graduated with a significantly higher proportion (88.3%) than either the defined underachievers (74.4%) or the remainder of the total sample (81.9%). Significantly more overachievers (56.9%) than underachievers (40.5%) who opted for Bachelor of Science programs found success in them, and more overachievers also entered graduate school. It would seem not only that overachievers and underachievers can be validly defined for admission purposes but also that the overachievers, who had relatively low scholastic aptitude test scores, represented a type of risk desired to be found for this report, those with potential for success.

A second type of candidate for admission, those who present College Board scholastic aptitude test scores with either SATv or SATm scores imbalanced (about 150 points or so) with respect to the other. The design allowed for the normal difference for males in such scores. It was concluded that insofar as general academic success in college was concerned, neither type were particularly risks. However, when the matter of degree choice and outcome at graduation was taken into consideration, it was found that it was no more realistic for students who presented SATm scores so heavily in excess of SATv scores to believe that they would be any more successful in the Bachelor of Science programs than students who presented balanced SATm and SATv scores. About 60% either transferred to Bachelor of Arts programs or dropped out of Brown altogether. Since about 60% of defined overachievers who elected Bachelor of Science programs actually attained the degree, and since there was repetition of findings in the cross-validating samples of the Class of 1969, it would seem that a defined overachiever who elects a Bachelor of Science program has significantly higher potential for success than a candidate who presents mathematical scholastic aptitude scores on the order of 150 points in excess of his corresponding verbal scholastic aptitude score and who elects this degree program.

A third type of risk, representing about 10% of Classes 1966 through 1969, was clinically defined on the basis of the experience of an admission officer. These risks were homogeneously weak. One of the more important findings concerning them was that for such a group, where academic variables were not able to discriminate between those of them who eventually graduated, did not graduate, or were delayed in graduation, non-academic variables were not so restricted. Further, since over 75% of such risks of Classes 1966-1968 and over 80% of such risks of the Class of 1969 actually graduated, it was found that admission officers _can_ select risks who will graduate. The importance of this for a private college is that it _can_ go down as well as up with respect to admission credentials without hurting either its image or its standards. When the composition of such clinically defined risks was examined, it was found that almost 100% of them would also have been chosen by three of the determinations of risk in this report: those with a score less than 620 on SATv (about 90%); underachievers (about 30%); and those with SATm in excess (about 24%). The weakness of the clinical approach is that it accounted for only some of each type. The strength of the objective approach is not only that it accounts for all of the defined types but also that it is a simple matter in this age of the computer to put such information into the admission officer's hand prior to decision making.

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APPENDIX

Admission Forms used by Brown

Personal Information Forms for Admission to The College (Class of 1973--Sample)

Form 2A	Items 6 through 17 comprise the inventory from which the Environmental Index was derived.
Form 2B	Items 1 through 13 make for LAS, the index of pre-college leadership-athletic-social activities and accomplishments. Items 14 through 40 make for LOMAS, the index of pre-college literary-oratorical-musical-artistic- and scientific activities and accomplishments.
Form 3	The Secondary School Report. The Admission Index was derived from Items A.1.(Motivation) and C.2.

Sample Rating Form Classes 1950-1952

The proximate Admission Index for Classes 1950-1952 was derived from this part of the Admission Forms for the old classes in the study.

To be completed
by the applicant

Form 2A

BROWN UNIVERSITY

Personal Information Form
for Admission to The College

This is the second form to be filled out by an applicant to Brown. It should be completed and returned to the Admission Office before 1 January 1969. If you have not sent Form 1, the Final Application Form, to the Brown Admission Office, write to the Board of Admission, Brown University, Providence, Rhode Island 02912, and request that it be sent to you.

1. Print name in full ....
First Name Middle Name Family Name

REQUIRED PHOTOGRAPH

(Write name on back of picture) We prefer a photograph, approximately the size of this boxed space. An informal snapshot is acceptable. Do not send a proof that will fade.

If no photograph is available at present, do not delay returning this blank, but mail photograph as soon as possible.

Height ....

Weight ....

Health ....

Physical defects or disabilities ....

....

I {graduated ☐ / expect to graduate ☐ (Check one)} in ....
Month Year

2. Father: (a) name in full ....

(b) where and when born.............................. Date..............................

3. Mother: (a) name in full ....

(b) where and when born.............................. Date..............................

4. Guardian: (if applicable)

(a) name in full ....

(b) where and when born.............................. Date..............................

5. Brothers: names and ages ....

Sisters: names and ages ....

(a) if brothers or sisters have attended college, give name of college and years of attendance.

....

....

Place an (X) in the columns at the right according to the instructions pertaining to each question on these two pages.

6. Check all items which, in your opinion, best describe your secondary school.

Public School	**( )**	**Private School**	**( )**
All male students	**( )**	**Coeducational**	**( )**
About three quarters or more of the graduating class go to college	**( )**	**About one half or less of the graduating class go to college**	**( )**
It has done a good job in preparing me for college	**( )**	**It has not done a very good job in preparing me for college**	**( )**

7. Indicate the subject area that you have enjoyed most and the area that you have enjoyed least in secondary school. (Check *twice* only; *one* most liked and *one* least.)

	Most	***Least***		***Most***	***Least***		***Most***	***Least***
Art or Music	**( )**	**( )**	**Language**	**( )**	**( )**	**Sciences**	**( )**	**( )**
English	**( )**	**( )**	**Mathematics**	**( )**	**( )**	**Social Studies**	**( )**	**( )**

8. Check the item which best describes you in secondary school. (Check one only.)

Once I started an academic course, I never changed it. ( )

Only once do I remember changing a course after I had started it. ( )

I changed courses on more than one occasion after I had started them. ( )

9. If you could be remembered as one of these, how would you wish to be remembered at your secondary school? (Check one only.)

Brilliant student ( ) Outstanding athlete ( ) Most popular ( )

10. Check in the appropriate column at the right whether you like or dislike participating in the following activities. (It is not necessary to check every item.)

	Like	***Dislike***		***Like***	***Dislike***
Viewing modern art	**( )**	**( )**	**Debating**	**( )**	**( )**
Watching television frequently	**( )**	**( )**	**Literary activities**	**( )**	**( )**
Listening to popular music	**( )**	**( )**	**Dramatic activities**	**( )**	**( )**
Taking part in heavy contact sports such as football or lacrosse	**( )**	**( )**	**Scientific activities**	**( )**	**( )**
Reading poetry	**( )**	**( )**	**Social activities**	**( )**	**( )**

11. How many books do you own personally? Do not count textbooks, but do count serious paperbacks.

Less than 10 ( ) Ten to 30 ( ) 31 to 75 ( ) More than 75 ( )

12. Check which of the following best describes your community. (Check one only.)

Open country ( )   Town 10-50,000 ( )   Large city of 500,000 or more ( )

Small town ( )   City 50-500,000 ( )   Suburb in a metropolitan area of 100,000 or more ( )

13. Check the following as they best apply to your father (or as they best applied prior to his retirement, unemployment, or death.)

(a) If your father was a 4-year college graduate, what college? ....

(b) Indicate your father's highest degree in the appropriate space. (Check one only.)

Bachelor's degree ( )   Master's degree ( )   Doctorate ( )

(c) Check the category that best describes your father's occupation. (Check one only.)

Worker (e.g., carpenter) ( )   Semi-professional — requiring special training ( )

Service worker (e.g., policeman) ( )   Professional — requiring bachelor's degree ( )

Executive or owner of business ( )   Professional — requiring advanced degree ( )

14. Check the following as they best apply to your mother (or as they best applied prior to her retirement, unemployment, or death.)

(a) If your mother was a 4-year college graduate, what college? ....

(b) Indicate your mother's highest degree in the appropriate space. (Check one only.)

Bachelor's degree ( )   Master's degree ( )   Doctorate ( )

(c) Check the category that best describes your mother's occupation. (Check one only.)

Housewife ( )   Semi-professional — requiring special training ( )

Service worker (e.g., practical nurse) ( )   Professional — requiring bachelor's degree ( )

Executive or owner of business ( )   Professional — requiring advanced degree ( )

15. How many different magazines do your parents subscribe to or buy regularly?

Two or less ( )   Three to six ( )   Seven or eight ( )   Nine or more ( )

16. Check each of the following as it may apply to you in your first year at Brown.

Expect to work six or more hours per week for payment   Yes ( )   No ( )

Expect to receive scholarship assistance   Yes ( )   No ( )

Expected total expenses: less than $3800 ( ) $3800-4200 ( )   over $4200 ( )
(room, board, tuition & personal expenditures exclusive of travel)

Expected area of greatest problem of adjustment: Academic ( )   Financial ( )   Social ( )

17. Do you hope eventually to join a fraternity?   Yes ( )   No ( )   Undecided ( )

18. In which college subjects or areas do you expect to be most interested?

19. College Entrance Examination Board Tests: ***It is the responsibility of each candidate to make the necessary arrangements to take the appropriate CEEB tests. The results should be officially reported to Brown.*** **As part of your application, check the date(s) of each test you have taken and those you plan to take.**

	Junior Year			***Senior Year***		
A. Scholastic Aptitude Test	**March ☐**	**May ☐**	**July ☐**	**November ☐**	**December ☐**	**January ☐**
B. Achievement Tests	**March ☐**	**May ☐**	**July ☐**		**December ☐**	**January ☐**

20. Have you applied for admission to Brown in the past? **If so, when?**

21. If you have ever been denied admission to any college, give name and date.

22. If you have applied or expect to apply to other colleges, name them.

23. Please give name or names of any people (teachers, friends, alumni or undergraduates) who have interested you in Brown.

24. Do you now plan to attend graduate or professional school after graduation from Brown?

If so in what field?

25. What have you considered for a vocation?

26. (a) Please state below any work experience or special activities during the past three summers:

If you have attended the Academic Potential Program or the NSF Program at Brown or any other institution please list.

Kind of Work or Activity	***Employer and/or Location***	***Earnings or Benefits***	***Period (Months and Years)***
(b) Employment during school year:			

27. (Optional) The evaluation process for admission to Brown is handled on an individual basis. A separate sheet of paper may be used to add any comments which you feel might be helpful to the Board of Admission in evaluating your candidacy.

To be completed
by the applicant

Form 2B

BROWN UNIVERSITY

Special Study

Personal Information Form
for Admission to The College

Print name in full .... Year of anticipated college entrance ....

Name of Secondary School ....

Several weeks ago you received another Personal Information Form (Form 2A) to be completed and returned to us. We would now like you to complete the following pages as a part of a special admission study we are making.

You were selected at random to participate in this study, and although your application will not be directly affected by your answers, we know you will be as thorough in completing this form as you have with previous application materials.

Please return this form immediately to the Brown Admission Office. A self-addressed envelope is enclosed.

Sincerely,

The Board of Admission

SURVEY OF PRE-COLLEGE AND COLLEGE ACTIVITIES AND ACCOMPLISHMENTS

For each item about which you can say "I have done this" or "I have been this," please check in the appropriate column or columns.

The back of this form may be used to describe in greater detail any of the accomplishments that you have checked.

	During High School Years	
	In High School	*Outside of High School*
1. Active participant in organized sports or games	( )	( )
2. Awarded a varsity letter	( )	( )
3. Received one or more awards for prowess or sportsmanship	( )	( )
4. Equaled or broken a local, national, or international sports' record	( )	( )
5. Member of a varsity team	( )	( )
6. Represented a school or organization in an athletic contest at the state, national, or international level	( )	( )
7. Member of a fraternity	( )	( )
8. Active and contributing member of a religious organization	( )	( )
9. Engaged in activity which assisted disadvantaged people	( )	( )
10. Elected to membership in a philanthropic organization	( )	( )
11. Elected to one or more student or other offices	( )	( )
12. Promoted to Eagle Scout	( )	( )
13. A founder or charter member of a society or organization	( )	( )
14. Elected to a National Honor Society	( )	( )
15. Placed on the Dean's List at least once	( )	( )
16. Soloist or regular member of a band or orchestra	( )	( )
17. Won an award for music (playing or singing)	( )	( )
18. Won an award or prize for musical composition	( )	( )

	During High School Years	
	In High School	*Outside of High School*
19. Presented a musical work for possible publication	( )	( )
20. Regular member or conductor of a choir	( )	( )
21. Presented or participated in an original scientific paper	( )	( )
22. Invented a patentable device	( )	( )
23. Received an award in a science exhibition or competition	( )	( )
24. Gathered together a collection of scientific things	( )	( )
25. Engaged in scientific breeding or propagation	( )	( )
26. Member of a scientific club or organization	( )	( )
27. Had a work of art exhibited or published	( )	( )
28. Won an award or prize for art, sculpture or ceramics	( )	( )
29. Constructed a model or object calling for special skill	( )	( )
30. Gathered together a collection of art or artistic objects	( )	( )
31. Member of an art or photographic club or organization	( )	( )
32. Placed first, second or third in a debate or speech contest	( )	( )
33. Active member of a drama or oratorical organization	( )	( )
34. Solicited to speak to a critical audience	( )	( )
35. Appeared on a T.V. or radio panel	( )	( )
36. Publicly debated with an active or known politician	( )	( )
37. Had published a poem, story, essay, or play	( )	( )
38. Won a literary prize or award for creative writing	( )	( )
39. Member of a literary society or writers' club	( )	( )
40. Member of the staff of a newspaper or yearbook	( )	( )

(optional)

41. The following space is provided for you to add any other interests that you have or to expand upon any of your accomplishments noted on the previous two pages.

Date .... **Signed** ....

this space

To the applicant: Please give to the appropriate school official

Form 3

Please Complete and Return This Form as Soon as Possible

BROWN UNIVERSITY

SECONDARY SCHOOL REPORT

Name of Candidate ....
(Please print or type) Last First Middle

Candidate's Address ....
Street Address City State Zip Code

School ....
Official Name Street Address City State Zip Code

School Telephone Number ....

Area Code Number ....

To the Candidate:

After you have filled in the five lines above, give this form to your principal, headmaster, or college adviser.

To the Principal or College Adviser:

This student is applying for admission to Brown in 1969. A full and candid report from his school is essential if he is to be given fair consideration. We therefore ask for careful ratings of and comments about his character and ability by a school official who knows him well. An inadequate report may damage the candidate's chances for admission.

Deadlines: Please file this report as soon as possible after you receive it and in any case not later than January 1, 1969. Retain the Mid-Year School Report form to report grades, rank and additional comment for the current school year through the first senior term. The Mid-Year School Report should reach us by February 10, 1969 if possible. Late filing of either of these reports will make careful consideration more difficult.

Rank in Class: It is essential to include in your report a statement of the candidate's rank in class and how it is determined. If this rank is not given, the processing of the application will be delayed and he may not receive full consideration with our other candidates.

The Transcript: A transcript form is included on the back page for your convenience. However, you may send us any legible transcript form which your school currently uses. The transcript should provide at least the following information:

a. Courses taken, year taken, and grades.
b. Courses failed or repeated.
c. Courses currently in progress.
d. Indication of honors, accelerated, and Advanced Placement courses or sections.
e. A brief explanation of your grading system.
f. Test results, such as IQ, NMSQT, CEEB, and Reading.
g. Numerical rank in class. (Please explain which course grades, which school terms, and what course weighting — if any — are considered in the computation of class rank.)

Mailing Instructions: Please return the completed form to the Admission Office, Brown University, Providence, Rhode Island 02912.

Thank you for your help.

CHARLES H. DOEBLER
Director of Admission

As of May, 1968, over 70 colleges were planning to use this school report form. Space is too limited to list the colleges here, but a list of colleges using the form is available on request.

Questions A1 through C1 of this form are designed so that secondary schools may send similar or duplicated descriptions of a candidate to any of the colleges using this form. We hope this possibility will be helpful to you and will welcome any comment you may have about this experiment, which is now in its sixth year.

A. Intellectual Ability and Achievement

1. How would you rate the candidate as to academic ability and motivation?

	1	2	3	4	5	6	7	8	9
	Poor	Below Average	Average		Above Average		Excellent		Truly Superlative
Ability:									
Motivation:									

2. How well does the candidate express himself in:

	1	2	3	4	5	6	7	8	9
(a) Writing?									
(b) Speech?									

3. This candidate ranks { ☐ exactly ☐ approximately } ____________ from the top, in a { ☐ class ☐ college preparatory group }

numbering ________ students. This rank covers the period from ________ (month year) through ________ (month year)

(If precise rank is not available, please indicate approximate rank to the nearest tenth from the top: ________.

Approximately ________ percent of the graduating class expects to attend four-year colleges.

4. Is his record with you a true index of his ability, or have outside circumstances interfered with his academic achievement? (For example: illness, excessive involvement in extracurricular activities, term-time employment, difficult home situation, an overshadowing brother or sister, etc.) If not a true index, please explain in the "Summary and Recommendation" on the opposite page.

B. Character and Personality

1. In making the following ratings, please keep in mind that they will be used to compare this student with other very capable students. Please make them as realistically as you can in comparison with your college preparatory students. We recognize that you may not be able to rate with the precision implied by "top 2 or 3 percent"; the figures are rough guides only.

	No basis for judgment	Below Average	Average	Good	Excellent (top 10%, but not 2 or 3%)	Truly outstanding (top 2 or 3%)		
a.							Energy and Initiative	a.
b.							Independence	b.
c.							Originality	c.
d.							Leadership	d.
e.							Self-confidence	e.
f.							Warmth of Personality	f.
g.							Sense of Humor	g.
h.							Concern for Others	h.
i.							Reaction to Criticism	i.
j.							Reaction to Setbacks	j.
k.							Respect Accorded by Classmates	k.
l.							Respect Accorded by Faculty	l.

2. Has applicant a respected status among fellow students?

The main factors contributing to the respect accorded him seem to be:	The main factors contributing to his not being respected seem to be:
☐ superiority in studies ☐ success in athletics ☐ leadership in activities ☐ accomplishment in activities ☐ interest in other students ☐ personality	☐ superiority in studies ☐ lack of interest in other people ☐ manners, personal habits ☐ conceit ☐ not well known ☐ other (specify)

3. Do you have unqualified confidence in the candidate's integrity? If your confidence is qualified in any way, please explain under "Summary and Recommendation."

4. Has the candidate experienced any physical or emotional disability which affected his performance in school or is likely to do so in college? (If so, please explain fully under "Summary and Recommendation.")

C. Summary and Recommendation

1. Please write a summary appraisal of the candidate, assessing his personal and academic qualities and his promise as a Brown student. We are particularly interested in evidence about character, relative maturity, independence, his values and the things he is enthusiastic about, and any special talent or quality he possesses. We would like to know about both strong and weak points. Your description of him will become a part of his permanent confidential college file, and, if he is admitted, will help us in advising him. Please feel free to insert an additional sheet or to write a separate letter if the space below seems inadequate.

2. I recommend this candidate for admission to Brown University

	not recommended	without enthusiasm	fairly strongly	strongly	enthusiastically
for academic promise:	☐	☐	☐	☐	☐
for character and personal promise:	☐	☐	☐	☐	☐
Overall recommendation:	☐	☐	☐	☐	☐

Signed____________________ Length of time acquainted with candidate________________

Please Print Name____________________ Position________________ Date________________

Secondary-School Record
(REVISED)

Name, in full .... **Birth Date** ....
Last Name First Name Middle Name

Home Address ....
Number and Street City State

Name of Parent or Guardian .... **School accredited by**

Entered ....
Name of School
....
Month Year Location of School

Was graduated
Will be graduated
Withdrew
....
Month Year

Class periods are ...... minutes, ... times a week, ... weeks a year. Passing mark is .... College recommending mark ....

1. List your complete marking system, highest to lowest: .... Honor marks ....

2. List other secondary schools attended: ....

Are all failing marks for each year listed? ☐ yes ☐ no

CLASS RECORD

Check (✓) all subjects where no marks are given.
Star (*) all subjects in progress.

	Subject	Grade → Year → 19	1st Sem	9	1st Sem	10	1st Sem	11	1st Sem	12	Extra		Stand. Exams
English													
Lang.													
Math.													
	Check Spec. Lab Periods	Yes No											
Science													
Soc. Studies													
Other Subjects													

Notes

Any course designed to prepare students for the Co
lege Board Advanced Placement tests should be
the symbol (A.P.) – e.g. Math V (A.P.)
Use extra column for extra school year.
Use exams column for special exams, as Regents, e

TEST RECORD

	Name and Form of Test	Year Given	Score	%-ile Gr. Level	Bas
Mental Ability					
Reading					
Achievement					
Others					

ADDITIONAL INFORMATION

*Give available interpretation of tests on an enclosu

Date .... Signature .... Title ....

Permission to use this form granted by the National Association of Secondary-School Principals of the NEA, 1201 Sixteenth Street, N. W., Washington 6, D. C.

Sample Rating Form

Classes 1950-1952

PLEASE CHECK, comparing applicant with other students you have known

Qualities	Superior		Good		Average		Below Average		Do Not Know	
	+	-	+	-	+	-	+	-	+	-
Native Ability										
Originality										
Industry										
Reliability										
Leadership										
Maturity										
Emotional Stability										
Sense of Humor										
Social Adaptability										